Sarasvati

-- Vedic river and Hindu civilization

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(October 2008)
Sarasvati Research and Education Trust

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Preface

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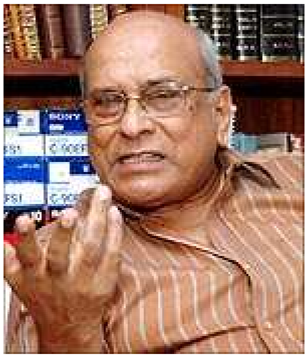
About the Author



Born on 20 October 1939, Dr. S. Kalyanaraman is a life-member of and regular participant in the World Association of Vedic Studies. He is a) author of a multi-lingual comparative dictionary for over 25 ancient languages of India, b) author of 14-volumes on Vedic River Sarasvati, civilization and script, c) editor of two editions of Rama Setu -- scientific, archaeological and security aspects and d) author of Public Administration in Asia, 2 vols. He is National President of Rameshwaram Rama Setu Protection Movement and Director, Sarasvati Research Centre of Akhila Bharatiya Itihasa Sankalana Yojana. He has a Ph.D. in Public Administration from the Univ. of Philippines and degree in Economics and Statistics from Annamalai University. He was a senior executive in Karnataka Electricity Board, Indian Railways and Asian Development Bank (ADB). In ADB where he worked for 18 years, he was responsible for setting up the world-wide network of info. systems and disbursement of a 60-billion US Dollar portfolio of loans. On Indian railways, he played a pioneering role in introducing computers apart from functioning as financial advisor. He is recipient of Vakankar Award (2000) and Dr. Hedgewar Prajna Samman (2008, 19th award).

About the book

The book is a summary of 14 books of the author on the subjects of Sarasvati civilization, language and writing system. The book is an answer to the ongoing attacks on Hindu symbols: Sarasvati, Vedic language and cultural traditions. The discovery of over 2000 archaeological sites on the banks of Vedic River Sarasvati and the possibility of identifying Vedic people from new discoveries such as those in Bhirrana provide a challenge to all researchers to unravel the language spoken by the creators of the Sarasvati civilization. There is an ongoing attack from some in Western academia, on Hindu symbols including svastika and the denial of the Vedic River Sarasvati whose ancient channels have been emphatically, scientifically identified. This state of academic denial is pathetic and is governed by a compulsive motive to establish Aryan supremacy through invasion or migration scenarios. Such Aryan Invasion/Migration Theories are in fact the myths. Sarasvati is not a myth but a reality and will flow again in North-west India thanks to the brilliant effort of scholars, researchers, scientists and engineers of Hindusthanam."

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Foreword

When Mohenjodaro and Harappa were discovered in the early 1930's during the British Colonial regime, on the banks of Rivers Sindhu and Ravi, they were hailed as the discovery of a Harappan or Indus Valley Civilization. As archaeological explorations and investigations proceeded, it became clear that over 80% of the 2600 archaeological sites were NOT on the banks of Sindhu river but on the banks of Vedic River Sarasvati which is also mentioned in a very ancient text, Rigveda in 72 rica-s.

The conference on Vedic River Sarasvati and Hindu Civilization (Delhi, Oct. 24 to 26, 2008) highlights the findings of scientists and researchers particularly during the last 60 years after India achieved Independence in 1947. These findings are based on a variety of disciplines: hydrology, meteorology, glaciology, seismology, sea-level changes, ice-age cycles, evolution of metallurgical and other technologies, architectural, agricultural and other cultural artefacts. These findings throw a new light on the civilization which is now rightly called Indus-Sarasvati civilization.

Over 30 scholars/scientists' multi-disciplinary contributions included those of Prof. KS Valdiya, INSA Golden Jubilee Professor in Geodynamics, Jawaharlal Nehru Advanced Centre for Advanced Scientific Research, Bengaluru; Prof. BB Lal, former Director General of Archaeological Survey of India; Dr. Gyaneshwer Chaubey, University of Cambridge; Prof. Shivaji Singh, former Head of the Department of Archaeology and Ancient Indian History, Gorakhpur University; Prof. TP Verma, Head of Department of Archaeology and Ancient Indian History, Benares Hindu University, Prof. Adiga Sundara, Head of Department of Archaeology and Ancient Indian History, Karnataka University; Dr. JR Sharma, Dr. AK Gupta, Dr. Bidyut Bhadra, scientists from Indian Space Research Organization; Dr. M Rao, scientist from Oil and Natural Gas Commission working on Sarasvati Project in Haryana-Rajasthan; Water management experts from Haryana working on reviving Vedic River Sarasvati; Dr. S. Kalyanaraman, Director, Sarasvati Research Centre, author of 13 books on Sarasvati, of Indian Lexicon, a comparative dictionary of over 25 ancient Indian languages..

The booklet is intended to summarise the state of researches related to Vedic River Sarasvati and the indigenous evolution of Hindu civilization on this river basin. The booklet is intended for a general audience. Conference Papers compilation including detailed presentation and discussion of findings is in about 300 pages.

The primary objective of the booklet is to provide, in simple terms, a multi-disciplinary framework based on researches by well established scholars in diverse scientific fields (archaeology, glaciology, ancient history, numismatics, space research, ground water etc) to collectively consider and evaluate the extant researches. The focus is on the role of this mighty ancient river Sarasvati in the Vedic settlements constituting the fountainhead of ancient Hindu civilization and building up a harmonious construction of

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the connected civilizations. The true story of ancient Bharatam unfolds itself, like the unfolding of the peacock's feathers in a civilizational dance (Hence, the use of this figure on the title page).

The booklet is organized in three chapters:

1. Sarasvati in Sapta sindhu region
2. Rediscovery of Vedic River Sarasvati (including a decoding of the writing system of Indus script as Sarasvati hieroglyphs, mlecchita vikalpa mentioned by Vatsyayana in his vidyaa samuddes'a s'loka in Kamasutra. Mleccha was the lingua franca spoken by Yudhishthira in his conversations with Vidura and Khanaka, miner during the jatugriha parva. Mleccha vaacas is distinguished from arya vaacas by Manu to connote dialectical language and grammatically correct language. Mleccha just means ungrammatical lingua franca of the linguistic area of Sarasvati civilization.). The writing is an invention by metalsmiths, vis'vakarma who use the same technique even today in Swamimalai (lost-wax technique) for making bronze vigraha.
3. Revival of River Sarasvati (impetus for National Water Grid).

As Maa Sarasvati comes alive to rejuvenate the nation and herald a National Water Grid, an opportunity is provided for the citizens of the nation to pay homage to the ancestors who have given the nation of Hindusthan her identity and image as a dharma nation.

S. Kalyanaraman
8 September 2008

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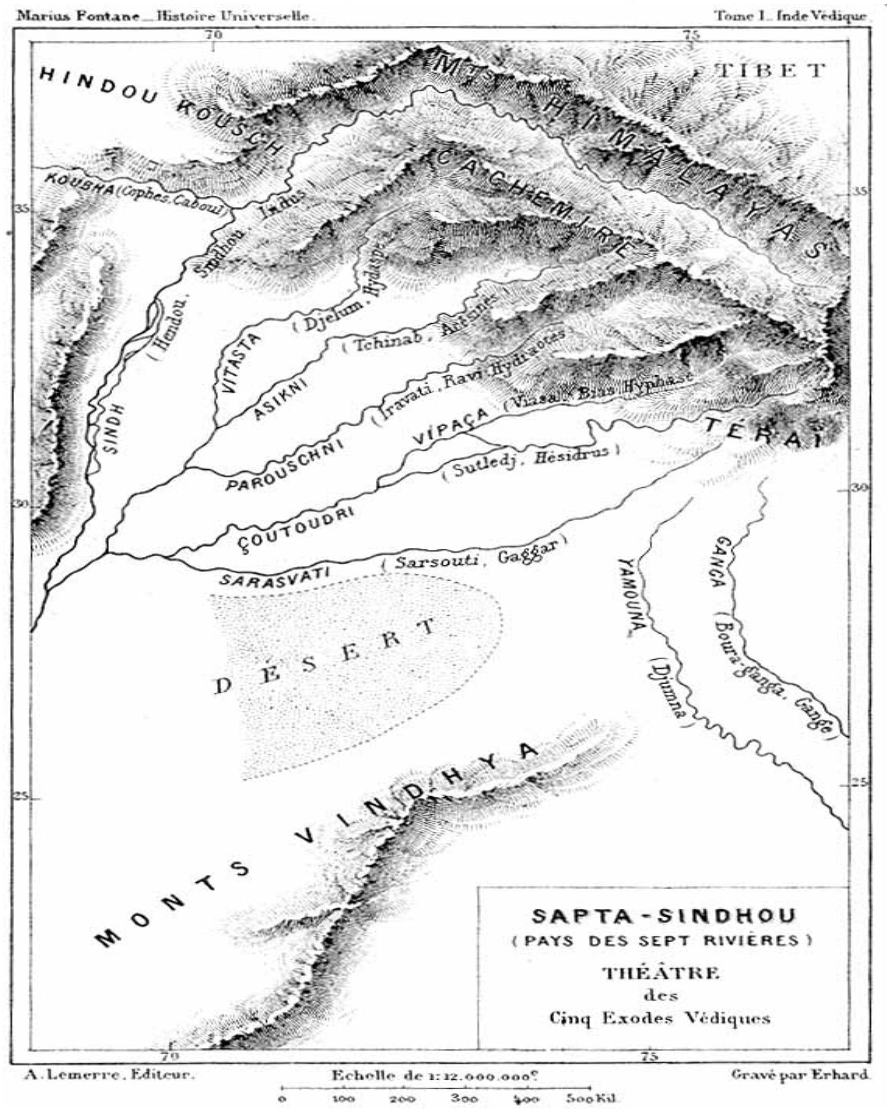
Sarasvati

-- Vedic river and Hindu civilization

Chapter 1. Sarasvati in Sapta Sindhu region



An early Hindu civilization area is sapta-sindhu region which is referred to in the Rigveda in the following words: “sarasvati saptathi sindhu mAtA” (Trans. River Sarasvati, the seventh, the mother of rivers.) Many scholars have successfully identified this region geographically as northwestern Hindusthanam. One such identification is provided by the map of Sapta Sindhu (Nation of Seven Rivers):
Theatre of Panchajanaah,
Five Peoples[1]
When Mohenjodaro and Harappa were discovered in the early 1930's during the British Colonial regime, on the left banks of Rivers Sindhu and Ravi, respectively, they were hailed as the discovery of a Harappan or Indus Valley Civilization. As archaeological explorations and investigations proceeded, it became clear that over 80% of the 2600+ archaeological sites were NOT on the banks of Sindhu river but on the banks of Vedic River Sarasvati which is also

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[1] Marius Fontane, 1881, *Histoire Universelle, Inde Vedique* (de 1800 a 800 av. J.C.), Alphonse Lemerre, Editeur, Paris

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mentioned in a very ancient text, Rigveda in 72 rica-s. The recent excavations in Bhirrana on River Drishadvati in Haryana have shown continuous settlements dating back to circa 5th millennium BCE prompting Prof. BB Lal to postulate the possibility of archaeologicalaly identifying Vedic people.

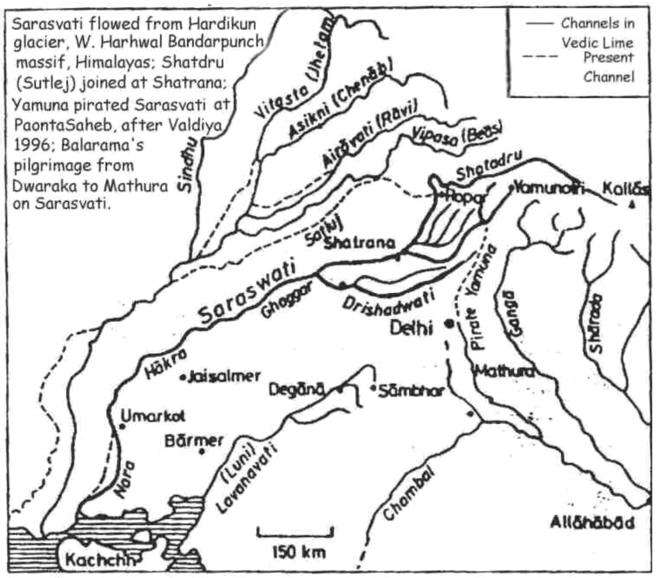
Indus Sarasvati civilization flourished circa 2500 to 1700 BC on the river valleys of Indus and Sarasvati. The dryingup of the Sarasvati river led to migrations of people.

The search for the language of the times may have to be based on identification of the ancient morphemes, starting from a study of comparative morphemes (with similar sounds and similar meanings) of the presentday languages spoken in the linguistic area of South Asia in the regions extending from Gandhara to Assam, from Nepal to Srilanka. This approach enables the rebus decoding of the Sarasvati hieroglyphs (so-called Indus script).

Hindu civilization was nurtured on the Sarasvati River Basin from Rigvedic times and the cultural indicators evidenced by archaeological discoveries and textual references, attest to the continuity of Hindu culture into historical periods. These make the Sarasvati River basin the fountain source of a continuum called Hindu civilization which can be traced back to at least 8500 years Before Present (BP) (cf. the evidence of s'ankha bangle made of *turbinella pyrum* shell in the burial of a woman at Mehergarh, 500 kms. north of Karachi. The nearest source for this shell is Makran coast near Karachi.)

Many scientists and scholars have established the courses of the ancient channels of this river using satellige images and geological/earthscience studies.

Here is a brilliant account of the rediscovery of Vedic River Sarasvati by Prof. KS Valdiya, Jawaharlal Nehru Centre for Advanced Scientific Research



Bangalore, summarizing the geological evidence [2].

Vedic River Sarasvati. The course was as shown by Prof. KS Valdiya[3]

[quote]

The Lost River Saraswati: Geological Evidence : A major river known as the Saraswati and formed by the confluence of the Shatadru (Satluj) and the Yamuna (of the past) flowed through Haryana, southern Panjab, northwestern Rajasthan and eastern Sindh and emptied itself in the Gulf of Kachchh. This river was much revered by.the Rigvedic scholars; and it nurtured the Harappan civilization until it disappeared during the Late Holocene time 3000 to 4000 yr Before Present. The disappearance of the Saraswati is a case of river piracy by branches of the Ganga and the Sindhu rivers.

Weaving together various threads of evidence adduced from archaeological, geomorphological and drainage-related studies, and gleaning relevant information

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[2] Abstract of paper presented at Vedic River Sarasvati Conference held in Delhi between 24 to 26 October 2008.

[3] KS Valdiya, 2002, *Sarasvati, the river that disappeared*, Hyderabad, Universities Press).

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from satellite imageries, it is surmised that the Saraswati River rose in the snowy realm of the Himadri in northwestern Uttarakhand, flowed southwest through one of the tributaries of the present-day Ghaggar River of the foothills and met the-then southeast flowing Shatadru (Satluj) at Shatrana about 15 km south of Patiala. At the confluence, the channel was 6 to 8 km wide, pointing to a very high discharge of the Saraswati. The Ghaggar river is known as the Hakra in its middle reaches and as the Nara in the lower reaches. Significantly, the ground water recovered in the middle reaches from tubewells deeper than 60 m was found to be 22000 to 6000 years old, whereas in the shallow-well water carbon has been dated at 5000 to 1800 years. The age of the water increases downstream from Kishangarh. Since the tritium value is negligible, these waters do not represent the rainwater fed through contemporary recharge by rainwater. The deeper - and older - water must be attributed to the ancient river that flowed in the time earlier than 5000 yr BP.

Western Rajasthan was dotted with the settlements of the Stone-Age people. Parts of Rajasthan, Gujarat and Sindh were inhabited by the people of the Harappan culture (7000 to 3300 yr BP). More than 2000 settlements, including those of the Harappan culture and the *ashrams* of sages of the Vedic time lay on the banks of the River Saraswati that discharged into the Gulf of Kachchh. The *Rigved* describes Saraswati River in glowing terms - "Breaking through the mountain barrier" this "swift-flowing tempestous river surpasses in majesty and might all rivers of the land".

Tectonic uplift along the NE-SW trending fault-delimited blocks of the Aravali Range, caused the deflection of the headwaters of the Yamuna and the Shatadru, leading to the disappearance of this mighty river. The eastern branch deviated southwards around 3,700 yr BP, flowed through the channel of a tributary of the Chambal - what is now the Yamuna - and joined the Ganga at Triveni or A1lahabad. The consequent dwindling of the river discharge propelled the migration of the Late Harappan (3900-3300 yr BP) people upstream from the Ganganagar-Bahawalpur area to the upper reaches in the Siwalik. This is evident from a dramatic increase of the Late Harappan settlements in the Siwalik belt in southeastern Himachal Pradesh and the adjoining Haryana and Uttar Pradesh. As a matter of fact, this foothill region became populated for the first time.

Later, during the time of Gautam Buddha (who lived in the east about 2600 yr BP) the Shatadru River also betrayed the Saraswati, as it abruptly swerved westward to join the Beas of the Sindhu system. Deprived of the waters of these two major rivers, the Saraswati became a dry channel. The collapse of the Harappan civilization seems to be wholly due to the disappearance of the Saraswati and its associated rivers.

As tectonic activity continued to afflict the region, there were frequent disruptions, including changes in the river courses. However, some water of the Himalayan rivers continued to flow into the Hakra-Nara Channel until about 1245 A.D. when there was a great migration of the desert people out of the region. The Satluj ceased to contribute water in 1593 A.D. when it changed its course finally. It was not only the Satluj that was moving westwards, but also all rivers of the Sindhu system, including the Sindhu itself - have shifted westwards. The Sindhu migrated 160 km westwards in the historical times.

[unquote]

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Chapter 2. Rediscovery of Vedic River Sarasvati

A brief overview of the rediscovery of Vedic River Sarasvati and ongoing projects to revive the river are presented in the following Sections:

2.1 Analysis of evidence on the extent of the Indus-Sarasvati civilization in Indus Sarasvati river valleys.
2.2 Extracts from bibliographical references (mainly Landsat imagery analysis and studies.
2.3 Rigvedic (Rk,Rca,or rk) hymns on Sarasvati.
2.4 Standard device in front of the 'one-horned' heifer on many seals. (Writing system on Sarasvati hieroglyphs or so-called Indus Script epigraphs).
2.5 Sarasvati, Vedic language and cultural traditions.
2.6 Peopling of India: Abstracts of and notes on genetic studies.

The next chapter provides an overview of the revival of River Sarasvati (impetus for National Water Grid).

2.1. Analysis of evidence on the extent of the Indus-Sarasvati civilization in Indus Sarasvati river valleys

That the river nurtured the early Hindu civilization is established by the discoveries of over 2,000 archaeological sites on Sarasvati River Basin. These represent 80% of all sites of what was earlier called the Indus valley civilization.

There are continuing cultural indicators such as shiva linga, wearing sindhur at the parting of the wear, wearing s'ankha bangles, making bronze images using the lost-wax techniques, pushkarini as a teertham (so-called Great Bath of Mohenjodaro), yoga, guru sampradaya (so-called Priest king wearing uttareeyam leaving right-shoulder bare, called PORKAI in Tamil).

Mohenjodaro. Statuette of priest (muni?) wearing uttariyam, leaving right-shoulder bare.

Sarasvati civilization which emerged on the banks of this great himalayan glacial river is the present day Hindu civilization in an unparalleled continuum. This demolishes the Aryan Invasion/Migration Theory as a myth. Sarasvati is NOT a myth. The indologists' theory is a myth. Hindu civilization arose autochthonously/indigenously within India, first on the banks of River Sarasvati and then on River Ganga basin as people moved internally due to the desiccation of River Sarasvati due to tectonic and resultant river-migration causes starting 1900 BCE (Before Common Era).

An overview is presented on the ongoing work to make the River Sarasvati flow again to benefit 20 crore people in India. Haryana Govt. has started a project. The Rajasthan Nahar (called Sarasvati Mahanadi Roopa nahar) has now reached a distance of 1000 km.s carrying Manasarovar glacier waters (through Harike reservoir fed by Bhakra-nangal and Pong dams on tributary rivers Sutlej and Beas) upto Gedra Road, Gujarat. A further extention of 150 kms. will make the waters reach Gujarat by 2010, the Swarnajayanti year of Gujarat; Ghare ghare

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maa sarasvati, khetare khetare maa Narmada will be the slogan.

An action plan needs to evolve to 1) continue researches by exploration systematically using multi-disciplinary expertise of the sites on the Sarasvati River basin, by studying the formation and evolution of Bharatiya languages from Sanskrit-Prakrit (so-called Arya Vaacas and Mleccha Vaacas -- the grammatically correct and the spoken-vernaculars) and 2) to disseminate information on the results of researches to ensure incorporation in school level textbooks, issue of small booklets in all languages of the world, use of media to disseminate information on the cultural traditions and heritage exemplified by Hindu civilization based on dharma -- as a Sanatana Dharma continuum in action, as a global, universal ethic which can create harmony among civilizations.

Vedic and epic tradition on the river is concordant with the archaeological/geographical (and now landsat satellite) attestations.

Etymologically, sarasvati means `abundance of lakes (saras)'. The synonym of sarasvatI (goddess of vAk = speech or language) is brAhmI which is the name given to the early scripts used in aSOka's epigraphs of circa 300 BCE .

The sUkta 6.61 of the Rigveda is a dedication to sarasvatI river; sUkta 75 is the nadi sUkta dedicated to sindhu river. The trio: drshadvatI, Apaya and sarasvatI are extolled in Rk 3.23.4. Other Rks dedicated to the river are: 1.3.10, 1.3.11, 1.3.12, 2.30.8 , 7.95.1, 8.21.17 and 18. References are made to yajnas performed by king citra on the banks of the river.[Apaya may be a branch of the Chitang river; this may also have yielded the sememe: ab, Ap = waters].

BaudhAyana's DharmasUtra (I,1,2,9) describes MadhyadEsa as lying to the east of the region where sarasvatI river disappears, to the west of the black forest: kAlaka vana, to the north of the pAripAtra mountain and to the south of the Himalayas.

MahAbhArata (BhIshmaparva, 6.49,50): seven divyagangas: nalinI, pAvanI, sarasvatI, jambu, sItA, gangA and sindhu. The epic locates kurukshetra to the south of sarasvatI and to the north of DrshadvatI (iii, 83.204). [This area is defined as Brahmavarta in Manu Smriti 2.17]. The doab formed by these two rivers thus becomes the locus of the Bharata war of kurukshetra (fought on five lakes: samanta pancaka; said to be the northern sacrificial altar of brahmA: MB, Vana, lxxxiii). [Al Beruni found, in 1000 CE, a holy lake in Kurukshetra].

The epic provides an account of Balarama's sojourn along this river dotted with centers of learning and austerities. [The dividing line of Drshadvati is at Chunar near Varanasi; the modern name is Rakshi].

The driedup bed -- wadi -- of sarasvatI might have constituted the great road between hastinApur and dvArAvatI (dwAraka). Part of this road would have constituted the road from Sind to Delhi via Bahawalpur, MaroT, Anupgarh, Suratgarh, Dabli, KAlibaggAN, BhaT ner (Hanumgarh), Tibi and SIrsa suggested by Major F. Mackeson in 1844 to the British government (Report on the Route from Seersa to Bahawulpore, JAS BENG., XLII, Pt.I, 1844, No. 145 to 153)]. A synonym of sIrsa is sarsuti ! sarasvatI; at this place, about 100 miles below Rassauli, a fortress was built.

Hieun Tsang's reference to `five indies' is amplified by Cunningham to define northern India to comprise the Punjab proper including Kashmir and the adjoining hill states, eastern Afghanistan beyond Indus and the Sutlej states to the west of the sarasvatI river.

Geographically, the sarasvatI basin can be traced to the currently known: ghaggarnALIhakDArainInArA wAhindA mihrAnpurAN channels. Ghaggar might have been a stream that rose in the Siwaliks and that

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joined the sarasvatI. This network runs parallel to the Indus across Sind. The river flowed from the Himalayas to the Rann of Kutch.[4]

Geologically, the entire sarasvatI river bed, and the arm of the Arabian sea (formerly spanning into saline Ranns of kutch) into which the river fell are on an earth quake belt; an earthquake could have upraised this entire riverseabed profile, drying up the river. [This may explain the formation of the Thar desert on the left banks of the river in earlier earthquakes; also, perhaps of the Thal desert in Pakistan. Did some tracts of the thar desert support cultivation in ancient times? Geological surveys do indicate subsoil water in some tracts. Even today, over 2 million people in Rajasthan live in these tracts! The Sanskrit name is marusthalI. cf. Tamil marutanilam??].

Was this event of the dried-up sarasvatI linkable to the 12 years of drought in the Santanu reign -- an anecdote in the Mahabharata? Could this explain the migrations of the IndusSarasvati people to other parts of the subcontinent?

Another possibility is that the headwaters of sarasvatI were captured by sutlej (sutudrI) shrinking the water volume carried by sarasvatI. [cf. H.Raychaudhari, The Sarasvati, in Science and Culture, VIII, 12, June 1943; Studies in Indian Antiquities, Calcutta University, 1958, pp. 12141]. Yamuna is also considered a tributary of the sarasvatI (Wadia, D.N., Geology of India, London, 1949, p.41).

Could the internal migrations away from the Sarasvati River Basin into the Ganga basin, attested in a number of scholarly studies, have been caused by the (gradual?) dryingup of the river?

I was pleasantly surprised to find in the National Atlas of India (Hindi), Calcutta, 1957, Govt. of India publication; BharatBhUracanA map depicting Sarasvati Ghaggar in dotted lines apparently to denote dried-up river beds!

Given the present state of archaeological knowledge gained since the Harappan site discovery in the 1920's, it's time to change the name of the maritime Harappan Civilization to Sarasvati Civilization. The rationale for this suggestion based on locus, is provided and a number of research areas are proposed, for consideration by indologists:

Prof. Ahmad Hasan Dani writes[5]: `The Indus Civilization is today famed for its two cities of Harappa and Mohenjodaro ... Harappa ... its excavation also started as early as 192021 ... On comparing the material from the two places Sir John Marshall argued that the site of Harappa ``will probably never prove so lucrative as that of Mohenjodaro, for the reason that it was further removed from the main centre of the Indus culture in Sind.'' [6]He opined that this civilization ``was developed in the Indus Valley itself and was probably as distinctive of that region, as the civilization of the Pharoahs was distinctive of the Nile.'' To him goes the credit of coining the term The Indus Civilization. But his geographic horizon no longer holds good and the term deriving therefrom is open to question ... . The widespread nature of the Indus Civilization throughout Panjab and Sind had already expanded the meaning of the original term. Still later in the post 1947 period the Indus Civilization sites have been discovered in large number outside the present Indus region right up to the very borders of Yamuna in the northeast (Alamgirpur on the Hindon, a tributary of the Yamuna about 30 miles north of Delhi), along the driedup bed of the river Ghaggar in northern part of Rajasthan, and in Gujrat right upto the mouths of Narbada and Tapti rivers'.

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[4] cf. Oldham, C.F., JRAS, 1893, p.49 on the Lost river of the Indian desert; Sir A. Burnes, Memoir n the Eastern Branch of the River Indus, given an Account of the alterations produced on it by an earthquake, also a Theory of the formation of the Runn, TRANS.
RAS, III,1834, pp. 55088.

[5] Ahmad Dani, ed., 1981, *Indus civilization New perspectives*, QuaidiAzam University, Islamabad, , pp.3 12

[6] An. Rep. of the Arch. Survey of India, 192324, pp.4748.

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``Evidence from many sources, including that of archaeological remains associated with old river courses, indicates that a major river, stemming mainly from the same sources as the present Sutlej, flowed through Northern Rajasthan, Bahawalpur and Sind-- to the southeast of the present course of the Sutlej and the Indus -- in the third to second millennium BC. This river, known as the Sarawati in its upper course, at different times either joined the lower course of the Indus in Sind, or found its way independently into the Arabian Sea via Rann of Kutch.''[7] Ghaggar which reached the Hakra branch in Bahawalpur, is traditionally identified with the Sarasvati river. [cf. Sir Aurel Stein's explorations in the valley: Ancient India, no.5, 1949, pp. 1230; A. Ghosh discovered 25 Harappan sites (Indian Archaeology--a Review, 196263) in the ``region beginning right from the Pakistan border (eastwards) up to midway between Hanumangarh (bhaTner or bhattinagara) and Suratgarh in the Sarasvati valley and about 25 kms. east of Bhadra in the Drishadvati valley''; Dr. Mughal discovered more than 300 sites in the Bahawalpur area)]. Banawali excavated by Bisht is 15 km. northwest of Fatehabad, near the Sarasvati river and about 120 km. east of Kalibangan. Bhagwanpura, Dist. Kurukshetra, is located on the right bank of the Sarasvati river south of Rupar and is a site excavated by Joshi.

Linguistically, was this IndusSarasvati a region which had synthesized the IndoAryan (Gypsy, Dardic, Pan-jabi, Gujarati), Dravidian (Brahui, Tamil) and Munda language streams, before internal migrations began circa 1700 BCE? Was this a south asian linguistic area, circa 2500 BCE? In the lingua franca, was the river called khal = stream (Tamil)? [khAyal (Malayalam); khADI (Gujarati); khAl (Hindi)]? Was drshadvatI like gangA, a term absorbed from Munda? [The absorptiion of the Dravidian retroflex sounds render the Indo-Aryan tongues to be distinct from the IE; also, cf. references to Indian sememes in Turner's comparative indoaryan dictionary and S. Kalyanaraman, *Indian Lexicon.*[8]

What are the dates of the formation of the Rann of Kutch? What are the dates of the dryingup of the Sarasvati river? Do the vivid landsat pictures of the lost river skirting the Indian desert convey enough informa tion to unravel the geological causes of the dryingup? Maybe, further researches to firm up these dates will hold a clue to unravel the apparent discontinuity be tween IndusSarasvati protohistoric culture (circa 2500 - 1700 BCE) and the linguistic evidence of the historical periods (circa 300 BCE) of the region. [Recent excava tions in Banawali and Dholavira seem to establish the continuity of settlements bridging this apparent gap between circa 1700 and 300 BCE belying some theories about the abrupt disappearance of the Harappan tradition, say, caused by floods on the Indus?]

2.2. Extracts from bibliographical references (mainly Landsat imagery analysis and studies in earth sciences) providing leads to determing the course of the ancient, `lost' Sarasvati river.

A bibliographical note refuting/questioning the Aryan Invasion/Migration Theories has been annexed.

The following extracts, principally from principally earth sciences[9] and LANDSAT literature establish the existence of Sarasvati river contiguous to the Indus river valley and the area of Rann of Kutch and the Gulf of Khambat (Cambay) in Gujarat. This region is studded with many Harappan culture sites.

Mohenjodaro (lit. 'mound of the dead') is a site on the left bank of River Sindhu and the right bank of River Sarasvati (also referred to as Ghaggar-Hakra-Nara-Mihran).

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[7] Allchin, B., Goudie, A., and Hegde, K., 1978, The prehistory and palaeogeography of the Great Indian Desert, London, Academic Press, p. 198.

[8] :cf. http://www.scribd.com/doc/2232617/lexicon *An Indian Lexicon -- comparative dictionary of 25+ ancient Bharatiya languages*..

[9] Radhakrishna, B.P, & Merh, S.S>, eds., 1999, *Vedic Sarasvati: Evolutionary History of a Lost River of Northwestern India*, Bangalore, Geological Society of India, Memoir No. 42

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Harappa is a site on the left bank of Ravi; Kaliban gan is a site on the right bank of Sutlej; Amri is a site on the left bank of Indus (close to the Arabian sea); Banawali is located 15 km northwest of Fatehbad, near the Sarasvati river and about 120 km east of Kalibangan; Lothal and Rangpur are sites below the Rann of Kutch.

Analyses of Landsat images

Bimal Ghose et al (1979) use photographs taken in 1972. Plate V traces the wide valley of the Sarasvati running from Suratgarh through Anupgarh to Fort Abbas and Ahmadpur East. From Anupgarh another wide belt of discontinuous patches of dark grey tone runs southwestward upto Sakhi. From Sakhi, the remnant of a former valley can be traced towards the west ... the imagery reveals the presence of a narrow zone of saline/alkaline fields, partly obliterated by the overlying sand dunes, extending upto Khangarh. To the south of Khangarh, a narrow strip of green vegetation, producing a slightly darker tone than the surroundings, can be identified. It runs from Islamgarh, through DharmiKhu, Ghantial, Shahgarh, Babuwali and Rajar to Mihal Mungra. This was the course of the Sarasvati from the Himalaya to the Rann of Kutch after the river severed relations with Luni. South of Mihal Mungra, the course could be traced up to the present Hakra channel and there are indications of its having even crossed the Hakra channel (Plate VI). This signifies that the course of the old Sarasvati might have been somewhere to the west of the present Hakra ... The other major courses of the Sarasvati could be identified further to the west, through Mithra and Sandh, the remnants of which are now known as the Raini and the Wahindaa rivers. Here also the river shifted its course several times, and, at one time, flowed to the east of the Wahinda river, through Mundo. Finally, the river ceased to flow southward and met the Sutlej to the west of Ahmadpur East.

Ramasamy, Bakliwal and Verma (1991) show satellite photographs mosaiced, planimetrically controlled ... Figure 1 show the last tongue of the Sarasvati river ... The study of remotely sensed data in the desert tract of Rajasthan shows that there are plenty of paleochannels with well sprungup tentacles throughout the desert (figure 3). On the northern edge of the TharGreat Indian desert at the GanganagarAnupgarh plains a well developed set of paleochannels are clearly discernible in satellite photographs (figures 1 and 4). Bakliwal et al (1988) have explained that these well sprungup paleochannels are traces of the mighty Sarasvati river which once ruled the desert. Yashpal et al (1980) have argued that the paleochannels observed in the Anupgarh plains are the arm of the Sarasvati river, which has been displaced by the present day Gaggar river ... that the Sarasvati river once flowed close to the Aravalli hill ranges and met the Arabian Sea in the Rann of Kutch, that it has migrated towards the west, the northwest and the north and has ultimately got lost in the Anupgarh plains ...

Yash Pal et al (1980) present in Figure 3 a synoptic view provided by the Landsat of the northwestern Indian subcontinent showing 68 km wide paleochannel of the Sarasvati ... ; Figure 4 shows the old bed of the Sarasvati river ... Figure 7 shows a synoptic view of the Indus valley showing possible course of the Sarasvati beyond Marot through the Nara into the Rann of Kutch ...

Alex Rogeres[10], who was perhaps among the earliest observers of the geology of the Gulf of Cambay (close to Lothal), points out that from the geological formation of the country bordering on the Rann, it appeared that the drainage of the PanjAb once flowed into it: `` ... The rapid silting up of the Gulf of Cambay gives particular interest to an inquiry into the geological conditions which probably shaped it in remote ages ... (The head of the Gulf) comprises within itself te Great Runn of Cutch ... primary or metamorphic rocks are traceable in its immediate vicinity only in a small tract on its west coast ... even the highest points of the granite peaks sho signs of weathering, and probably also of the erosive action of waves ... Many considerations point to the existence in former aagers of some large river flowing down

[10] Alex Rogers, 1870. A few remarks on the Geology of the country surrounding the Gulf of Cambay in Western India, *Quarterly Journal of Geological Society of London*, 26: 118124

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from the north, and falling into the Indian Ocean somewhere in the position of the present Gulf of Cambay: and it is not improbable that that river may have been the Indus. It may have been that the original course of the Indus from the Punjab was in a more southeasterly direction than that of the present day ... (In this Gulf), coinciding to a large extent with the blacksoil belt, there can be clearly traced a natural depression in the surface of the country for some twenty miles from the head of the Gulf, terminating in a shallow lake of brackish water called the Null ... Shells of the genus CERITHIUM, an estuarine form, are found lying loose in the black soil many miles from this oint (Bhogava); and the records of the old Revenue Survey of Goozerat state that there were formerly found in the Null large stones with holes through them, which had evidently served as anchors for boats of some size ... [cf. the ring stones found in Mohenjodaro] ... there is his torical and wellknow proof of the alteration of the level of the larger of these salt flats as the consequence of an earthquake in AD 1819 ... only a much more violent action would have separated the laterites of the high and low levels ... this rock, again, appears at precisely the same level on the opposite sides of valleys in the Concan and Deccan, giving ample proof of dunudation ... at the time (some of the Vedas) were composed, the Suruswuttee, the most easterly of the Punjab rivers, which now loses itsels in the desert of Rajpootana, flowed into the Indian Ocean. This confirms to come extent the theory of the case of the alluvial deposit at the head of the Gulf of Cambay.''

HG Raverty[11] notes: `` ... to notice some of the numerous fluctuations in the courses of the Sindhu, Abi-Sind, or Indus, and of the rivers of the Panjab. The changes in the courses of two of these rivers, together with the drying up of the Hakra, Wahindah, or Bahindah were so considerable that they reduced a vast extent of once fruitful country to a howling wilderness, and thus several flourishing cities and towns became ruined or deserted by their inhabitants ...the old course of the Biah, or `Bias' previous to its junction with the Sutlaj, when both rivers lost their names and became Hariari , Nili or Gharah ... why the army of Islam marched along the bases of the mountains, for the route was long, and the way by Sasruti and Marut was nearer? He (Mangu Khan) was answered that he numerous fissures on the banks of the river rendered the way impossible for the army ... Sarasti is the ancient name of Sirsa: Sursuti is the name of a river, the ancient Sarasvati ...Sutlaj was a tributary of the Hakra or Wahindah ... Hakra ... appears to be the modified form of Sagara, the letter S being pronounced H in Rajputana and Sindh ... Sagar is the Sanskrit for `ocean', `sea' etc., and it is still known as the SindSagar near the sea coast. Tod calls it the `Sankra', which is another form of the name; and it is called Sankrah in the treaty entered into by Nadir Shah, and Muhammad Shah, Badshah of Dihli, when ceding all the territory west of it to the Persians ... Hakra did once run through the socalled `Indian Desert' ... Ghaggar, the Sursuti and the Chitang were also the tributaries of SindSagar or Wahindah or Hakra ... Mansuriyat ... this city is situated among the branches of the Mihran river, and from that place the river unites with the ocean by two channels. One is near the town of Loharanj, and the other bends round towards the east in the confines of Kaj (Kachch) and is called the Sind Shakar (SindSagarah) which means the The Sea of Sind. The river Sarasat unites with the ocean to the east of Suminath. This last names river is, of course, the Sarasvati, which falls into he sea near Pattan Somnath, not the classical river, the tributary of the Ghagghar, described farther on, the sacred river of the Brahmans ... At Thatha the Sind is called Mihran ...''

Lawrence Leshnik[12] observes: `` ... The Volkerwanderung that brought the Harappans to Lothal (2450 BC) is conceived of as a sea passage from the Indus ... This dating is, however, questionable and exploration of the Kutch area has brought to light a number of Harappan sites there[13] so the arrival bysea theory will have to be reconsidered ... In Mohenjodaro there is a linear representation of a man using the shaduf, so that its presence is documented for the Harappan civilization as well ... Marshall describes the Mohenjo-

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[11] Raverty, H.G.Major, BombayArmy, 1893, The Mihran of Sind and its tributaries: a geographical and historical study, *Journal of Asiatic Society of Bengal*, Vol. lxi, Pt. 2, pp. 155297

[12] Leshnik, Lawrence S., 1968, The Harappan Port of Lothal: Another View, *American Anthropologist*, 70, 1968, pp. 911921

[13] Joshi, J.P. 1966, Exploration in Northern Kutch, *Journal of the Oriental Institute*, Maharaja Sayajirao University of Baroda, 16: 62 67,

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daro ringstones as having slots that were used to fasten stones to something that passed through the central aperture. This could have been the arm of a shaduf, to which the stone weights were lashed by rope or leather thongs. The shaduf is still employed near Lothal, although the stones are no longer pierced, but simply secured with rope. Pierced stones continue however to be used in this way in East ern India ... A note on the Lothal tank as an irrigation reservoir ... ''

R.D. Oldham[14] provides an insight: `` ... we have now seen that a dry river bed can be traaced, practically continuously, from Tohana in Hissar district to the Eastern Narra in Sind ... `` C.F. Oldham, 1893, The Sarasvati and the lost river of the Indian Desert, Journal of the Royal Asiatic Society, pp. 4876: `` ... local legends assert (that Sarasvati) once flowed through the desert to the sea. In confirmation of these traditions, the channel referred to, which is called Hakra or Sotra, can be traced through the Bikanir and Bhawulpur states into Sind, and thence onwards to the Rann of Kach ... attested by the ruins everywhere overspread what is now an arid sandy waste. Throughout this tract are scattered mounds, marking the sites of cities and towns. And there are strongholds still remaining ... Amongst these ruins are found, not only the huge bricks used by the Hindus in the remote past, but others of a much later make ... Freshwater shells, exactly similar to those now seen in the PanjAb rivers, are to be found in this old riverbed and upon its banks ... After entering Sind the Hakra turns southward, and becomes continuous with the old riverbed generally known as Narra. This channel, which bears also the names of Hakra or Sagara, Wahind and Dahan, is to be traced onward to the Rann of Kach ... Tha Hakra varies in different parts of its course from about two to six miles in width, which is sufficient for a very large river ... The only river near Marot was the Hakra ...

Lost courses of the Sarasvati

Bimal Ghose et al[15] state: ``Interpretation of LANDSAT imagery and field investigation in the western part of Jaisalmer district in India have revealed some hitherto unknown abandoned courses of the former Sarasvati river. It has been suggested that these courses were alive before the Sarasvati occupied the Raini or the Wahinda courses, and contributed to the alluviation of the region. The subsurface water in the region is contributed mainly by the Himalayan precipitation flowing subterraneously through the former courses of the Sarasvati ... .''

River migrations in Western India

Ramasamy et al[16] add: ``The art of remote sensing has opened up many vistas in the study of river migration as satellite photographs, both in their normal and digitally enhanced modes, vividly show the rivers and their migratory sig natures. The rivers migrate for various reasons amongst which tectonic movement is one of the main causes ...The study has shown that Western India sow considerable signs of Quaternary tectonics ... (Landsat photographs, on a 1:1 000 000 scale)... the palaeochannels were interpreted, as exhibiting linear, curvilinear and looplike features with typical black ribbonlike stripes ... The Landsat imagery studies show that the Indus river has a very wide flood plain on either side of its course up to a maximum width of 100120 km in the east and southeast. To have such a wide flood plain on only one side shows that the Indus river has preferentially migrated towards the northwest in the northern parts and towards the west in the central and southern parts. The study of remotely sensed data in the desert tract of Rajastan shows that there are plenty of paleochannels with well sprungup tentacles throughout the desert. On the northern edge of the TharGreat Indian desert at the Ganganagar-

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[14] R.D. Oldham, 1886, On probable changes in the geography of the Punjab and its rivers a historico-geographical study, *J. Asiatic Soc. Bengal*, 55: 322343

[15] Bimal Ghose, Amal Kar and Zahid Husain, 1979, The lost courses of the Sarasvati river in the Great In dian Desert: New evidence from Landsat Imagery, *Geographical Journal*, 145: 446451

[16] Ramasamy, SM, PC Bakliwal and RP Verma, 1991, Remote Sensing and River migrations in Western India, *Int. J. Remote Sensing, Vol. 12, No. 12*, 25972609

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Anupgarh plains a welldeveloped set of palaeochannels are clearly discernible in satellite photographs. (Bakliwal PC , Ramasamy, SM, and Grover, AK, 1983, Use of remote sens ing in identification of possible areas for groundwater, hydrocarbons and minerals in the Thar desert, Western India, Proceeding volume of the International conference on prospecting in areas of desert terrain. The Institute of Mining and Metallurgy Publications, 1417 April, Rabat, Morocco, 121129) have explained that these well sprungup palaeochannels are traces of the mighty Sarasvati river which once ruled the desert ... . (these and) the present study show clearly that the Sarasvati river once flowed close to the Aravalli hill ranges and met the Arabian sea in the Rann of Kutch, that it has migrated towards the west, the northwest and the north and has ultimately got lost in the Anupgarh plains ...

`` ... When the Aravalli hills are traced back to the foothills of the Himalayas the water divide of the Yamuna and Sarasvati rivers becomes apparent. Hence, it follows that the drifting of the Sarasvati river from its easterly flow towards the Great Indian Desert would have been initiated by such a rise in the Aravalli mountains and that due to the subsequent LuniSukri cymatogenic arching, the Sarasvati migration towards the northwest would have been accelerated ...

`` ... it seems that climatic changes have also played a subordinating role in shifting the (Sarasvati) river towards the north. When the Sarasvati flowed in a south westerly direction it was flowing against the northeasterly moving sand advance in the Thar desert. It can be concluded, therefore, that the Sarasvati river could not overcome such a sand advance and hence that it started drifting towards the north with a rotational migration in a clockwise direction until ultimately it was buried in the Anupgarh plains...”

Bakliwal and Grover[17] note: `` ... Remote sensing study of the Great Indian Desert reveals numerous signatures of palaeochannels in the form of curvilinear and meandering courses with feeble to contrasting tonal variations. The Sarasvati river, which is believed to be lost in the desert, could be traced through these palaeochannels as a migratory river. Its initial course flowed close to the Aravalli ranges and successive six stages took west and northwesterly shifts till it coincides with the dry bed of Ghaggar river. The groundwater, archaeological and pedological data with selected ground truths also corroborate these findings. The migration of river Sarasvati seems to be caused by tectonic disturbances in HardwarDelhi ridge zone, Luni - Surki lineament, Cambay Graben and Kutch fault facilitated by contrasting climatic variations. The stream piracy by Yamuna river at later stage is responsible for the ultimate loss of water and drying up of the Sarasvati river ... ``

Secrets of the Thar desert

Singhvi and Amal Kar[18] explain: `` ... In the south it (Thar desert) has a sharp natu ral boundary with the world's largest saline waste the Great Rann of Kahchh, while in the north the riparian subHimalayan plains define its boundary ... Quaternary continental sediments in the Thar desert of Rajasthan comprise a succession of fluvial, fluviolacusrine and aeolian deposits ... The neogene tectonic movements ... are considered as responsible for controlling the origin, configuration and development of basins of deposition... Occurrence of aligned earthquake epicentres of different dates from 1879 to 1976 AD along it (Luni-Sukri lineament from the Rann to the Sambhar lake) in the Kachchh area suggests its neotectonic potentiality ...

`` ... The dry bed of the Ghaggar is conspicuous on the satellite imagery of north Rajasthan and adjoining parts of Pakistan as a continuous wide belt running through Suragarh and Anupgarh in India to Fort Abbas and Ahmadpur East (in Pakistan) [(Ghose et al., 1979, The lost courses of the Sarasvati river in the Great

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[17] P.C. Bakliwal and A.K. Grover, 1988, Signatures and migration of Sarasvati river in Thar desert, Western India, *Rec. Geol. Surv. Ind.,* 116: Pts. 38, pp. 7786
[18] Singhvi AK and Kar, Amal eds., 1992, *Thar Desert in Rajasthan: Land, Man and Environment*, Bangalore, Geological Society of India, Bangalore

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Indian Desert new evidence from Landsat im ageries, Geographical Journal, 145 (3): 446451); Balki wal, PC and Grover, AK, 1988, Signatures and migration of Sarasvati river in Thar desert, western India, Rec. Geol. Surv. India, 116 (38)]. Some southflowing earlier courses of this stream were detected through the western part of Jaisalmer district and in the BikanerSardarshahr tract further east. Buried courses of another Himalayan stream, R. Drishadvati (which was also a tributary to the Sarasvati) were found in the ChuruNagaur tract. The rivers had several tributaries joining them from the Aravallis and other rocky areas within the desert. Recent SEM analysis of the Quaternary sediments of the north eastern part of the desert indicate considerable glacial, as well as fluvial, transport of some of the sediments [Raghav, KS, 1991, Quaternary history of a part of the northeast fringe of the Thar desert of India, Ann. Arid Zone, 30(4)]. The survival of the SarasvatiDrishadvati courses depended to a large extent on the perennial supply of water from the mightier Sutlej (the Satadru of Vedic literature) which shifted its course several times in the subHimalayan plains due o neotectonism, change of grade etc. (Valdiya, KS, 1989, Neotectonic implica tion of collision of Indian and Asian plates, Ind. J. Geology, 61: 113). A detailed account of former streams in the region is provided by Kar (Kar, A., 1992, Drainage desiccation, water erosion and desertification in north west India, in: Desertification in the Thar, Sahara and Sahel Regions, AK Sen ed., Scientific Publishers, Jodh pur). Some of the buried stream segments are potential ground water aquifers.. The course of the Sarasvati to the west of Jaisalmer has an estimated reserve of about 3000 mcm water awaiting a judicious exploitation ...

`` ... Mughal M.R.[19] has located a large number of settlements of the Hakra Ware culture, dating to the fourth millennium BC., and of the Harappan culture, dated to the third millennium BC, on this (Ghaggar-Hakra) river in Pakistan. Nearly two hundred settlements of the Harappan culture have been located by Indian archaeologists on the Ghaggar river and its tributaries in Punjab, Haryana and northern Rajasthan [20]... Kalibangan was aban doned at the beginning of the second millennium BCE., probably due to the drying up of the river and shifting of the Sutlaj away from it .[21]

Suraj Bhan[22] notes:`` ... The Kalibangan I culture (c. 2300 2100 BCE ... The Siswal A ware was recovered from 16 sites in the southwestern part of Haryana adjoining northern Rajasthan. It extended to Jind and Paoli in the northeat. The comparative preponderance of the ware in the Drsadvati valley suggests the preference of the preHarappan folk for smaller river valleys as in north Rajasthan ... But the absence of the Late Harappan ware from north Rajasthan and the adjoining regions of aryana (south of Vanawali near Fatehabad in the Sarasvati valley and Alipur Kharar near Hansi in the Drsadvati valley) suggests the survival of the Harappa culture in our region (as also in the northeastern Pan jab and western UP), after the lower and mid zones of the Sarasvati basin had been deserted. The desertion of the semiarid zone of north Rajasthan and Bahawalpur by the Harappans or the Harappainfluenced kindred folks, and their subsequent expansion further northeast seems to have been forced by the growing desiccation of the Sarasvati basin consequent upon the changes in the courses of the Sarasvati, Drsadvati and the Yamuna rivers. It was this second phase of the Harappan expan sion which was largely responsible for the colonization of the ancient Madhya Desa which ensued with the settlements of Daulatpur I, Alamgirpur I etc ... With more than 90 OCP or Late (degenerate) Harappan sites reported from the doab it would be difficult to agree with Agrawal (196768) that the doab was first colonized by the ironusing PGW people.''

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[19] Mughal, M.R., 1982, *Recent archaeological research in the Cholistan desert, in: Harappan Civilization,* GL Possehl, ed., Oxford, pp. 8595)

[20] Ghosh, A., 1952, The Rajasthan Desert its archaeological aspect, Bulletin of the National Inst. Sci., I : 37-42; Bhan, S., 1973, The sequence and spread of prehistoric cultures in the upper Sarasvati basin in: *Radiocarbon and Indian archaeology*, DP Agrawal and A. Ghosh eds., TIFR, Bombay, pp. 252263

[21] Lal. B.B., 1979, Kalibangan and Indus civilization, in: *Essays in Indian Protohistory*, DP Agrawal and DK Chakrabarti eds., BR Publ., Delhi, pp. 6597.

[22] Bhan, Suraj., 1973, The sequence and spread of prehistoric cultures in the upper Sarasvati basin in: *Radiocarbon and Indian Archaeology*, DP Agrawal and A. Ghosh eds., TIFR, Bombay, pp. 252263

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Yash Pal et al[23] observe: `` ... delineation of the palaeochannels of the Satluj, the Yamuna and the Ghaggar to trace the `lost' Saras vat. Study of Landsat imagery shows that the Satluj once flowed into the Ghaggar; it is also probable the Yamuna too was flowing into the Ghaggar river at the same time. The bed of this river is traceable upto Marot, from where it is likely to have extended through Hakra/Nara bed to the Rann of Kutch. The present dried bed of the Ghaggar was thus part of a major river, anciently known as Sarasvati. Analysis of satellite imagery supports the above hypothesis regarding the course of the `lost' Sarasvati ...

`` ... Satluj and Yamuna are perennial rivers ... the rivers Ghaggar, Sarasvati, Markanda and Chautang all rise from the Siwalik Hills and are nonperennial. They flow mainly during the monsoon. At present none of them reaches the sea or joins any major river as a trib utary ...

`` ... The sharp westward rightangled bend in the course of Satluj is suggestive of its diversion in the past, as at the point of river capture or stream diversion similar elbows develop ... There is a sudden widening of the Ghaggar Valley about 25 km. south of Patiala ... can be explained only if a major tributary was joining Ghaggar at this place. The satellite imagery does show a major palaeochannel joining the Ghaggar here ... Our observations are supported by the field data of Singh (Gurdev Singh, 1952, The Geographer, 5,27) who mentions a channel starting near Ropar and leading towards Tohana (29.35N, 75.55E). The area along this old course of the Satluj is called `dhaia' meaning an upland or high bank ... It might have required only a little tectonic movement to disturb its previous course and force it into its present channel ... Our studies show that the Satluj was the main tributary of the Ghaggar and hat subsequently the tectonic movements may have forced the Satluj westward and the Ghaggar dried. Wilhelmy (H., 1969, Z. Geomorphol. Suppl., 8, 76) considered ... the second alternative, i.e., river capture. The Satu dri (Satluj) might have been a tributary of the Vipasa (Beas) and through headward erosion captured the waters of the river coming down the Himalayas near Ropar. Tectonic movements may have aided the river capture ...

`` ... the Landsat imagery of the Indus system and it appears that the confluence of the Satluj with the Indus may not be an ancient feature. The palaeochannel of the river Beas, which is quite conspicuous in Landsat imagery, joined the Indus independent of the Satluj. There is a distinct palaeochannel which seems to suggest that the Satluj flowed through the Nara directly into the Rann of Kutch ...

`` ... The ancient bed of the Ghaggar has a constant width of about 6 to 8 km. from Shatrana in Pun jab to Marot in Pakistan. The bed stands out very clearly having a dark tone in the blackandwhite imagery and reddish one in false colour composites. There is a clear palaeochannel southeast of the river Markanda which joins the ancient bed of the Ghaggar near Sha trana ... Another channel which corresponds to the present Chautang (Drishadvati) seems to join the Ghaggar near Suratgarh. Near Anupgarh the ancient Ghaggar bed bifurcates and both the plaeochannels come to an abrupt end; the upper one terminates near Marot and the lower one near Beriwala. These two terminal chan nels of the Ghaggar seem to disappear in a depression which is suggested by salt encrustation and the physiography of the area ...

`` ... PalaeoYamuna was alive during the Painted Grey Ware (PGW) period (c. 800400 BC) as indicated by the distribution of the PGW sites on its banks (Gupta SP etal., 1977, Ecology and archaeology of Western India eds. DP Agrawal and BM Pande, New Delhi, Con cept Pub., p. 79). Both the Chautang and the Ghaggar beds have archaeological mounds on their banks (Pande BM, ibid, p.55). The Ghaggar continued to be a live river during the preHarappan (c. 25002200 BC) and the Harappan times (c. 22001700 BC). Even during the PGW times, there is some indication of habitation along the palaeochannel, though the PGW mounds follow a very narrow river bed, perhaps indicating a dwindling water supply. The

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[23] Yash Pal, Baldev Sahai, R.K.Sood and D.P. Agrawal, Space Applications Centre, and PRL, Ahmedabad, 1980, Remote sensing of the `lost' Sarasvati river,: *Proc. Indian Acad. Sci. (Earth and Planetary Sci.), Vol. 89, No. 3*, Nov. 1980, pp. 317331

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archaeological evidence for dating the Chautang is not very definite yet, though the late Harappan mounds along it appear to be a clear indica tion that it was a living river during at least the late Harappan time (c. 1700-000 BCE ...

`` ... For miles and miles around Marot one finds numerous place names with a suffix toba, which in the local language means a playa (or rann) ... It is obviously improbable for such a mighty river to vanish into a shallow depression (or khadins in the local languages) in its heyday. There is, therefore, a good possibility that the Ghaggar flowed into the Nara and further into the Rann of Kutch without joining the Indus ...

`` ... If the borehole samples from these areas are analysed, one is sure to come across mineralogical com- positions reflecting the signatures of the ancient Satluj and the PalaeoYamuna when they flowed through the Sarasvati bed ... A multidisciplinary approach employ ing archaeological, mineralogical, chemical and thermoluminescence, combined with remote sensing techniques can provide a clear and consistent history of these changes in the palaeochannels of northwestern subcontinent in an absolute timeframe.''

R.L. Raikes[24] (a hydrologist) and R.K. Karanth (a geologist) found at Kalibangan (in 1967) through a drilling program, that at a depth of 11 m. below the present floodplain level, a coarse, greyish sand very similar in mineral content to that found in the bed of the present day Yamuna. It extended over a width at least four times that of the bed of the presentday Yamuna and down to a depth, at one point at least, of 30 m. ..the material in short is typical floodplain deposit of the kind being laid down today at a rate of about 2 m. per thousand years.

Climate Change

Michel Danino[25] argues that the desiccation of Vedic River Sarasvati occurred during the mature 'Harappan' phase : "While some climatic studies of India's North-West indicate that aridity had set in even before the Mature Harappan phase, others point to a higher rainfall, especially in the eastern region, which includes the Sarasvati basin. There is, however, widespread agreement that the Sarasvati declined during the Mature phase and dried up around its end, while in the west the Indus appears to have shifted considerably in its lower course. Ecological factors impacted the Indus-Sarasvati civilization's agricultural resources and access to fuel wood, but also its river-based communication network. The pressure put on remaining forests by intensive Harappan industrial activities and agricultural requirements may have compounded such developments and hastened the collapse of the civilization's urban order."

This is consistent with K.S. Valdiya's evidence[26] for the existence of Vedic River Sarasvati as an independent river system, running parallel to and about 300 kms. east of River Sindhu, flowing from Mt. Kailas in the Himalayas and joining the Arabian sea.

Gurdip Singh[27] suggests that `` ... the significant increase in rainfall at the beginning of the third millennium BC, attested by palaeoecological evidence, played an important part in the sudden expansion of the NeolithicChalcolithic cultures in northwest India, ultimately leading to the prosperity of the Indus culture ... The present evidence would suggest that the onset of aridity in the region around 1800 BC probably resulted in the weakening of the Harappan culture in the arid and semiarid parts of northwes

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[24] R.L. Raikes, 1968, Kalibangan: Death from Natural causes, *Antiquity*, 42, pp. 286291.

[25] Michel Danino, 2008, 'Ecological issues in the end of the Indus-Sarasvati civilization', Paper presented in the Conference on Vedic River Sarasvati and Hindu Civilization

[26] .Valdiya, K.S., 2002, *arasvati: the river that disappeared,* Indian Space Research Organization & Hyderabad: Universities Press, 2002

[27] Gurdip Singh, 1971, *Archaeology and Physical Anthropology in Oceania*, 6, 177189: The Indus Valley Culture seen in the context of postglacial climatic and ecological studies in NorthWest India

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India ... ''

Amal Kar and Bimal Ghose[28] note` ... there are indications that the riveer formerly flowed southwards, through the desert, and was supplied from streams originating in the Aravallis, thus explaining the distribution of alluvium in the region ... Drishadvati ... means a stream with a pebbly bed ... The interfluve between the Sarasvati and the Drishadvati used to be known as Brahmavarta and was sacred ...
Sir Alexander Cunningham (1871, The ancient geography of India, repr. 1979, Indological Book House, Varanasi) first identified the Drishadvati with the modern Rakshi ... ``

Aurel Stein[29] investigates`` ... the sketchmap based on the latest survey shows how great is the contrast between the very scanty volume of water brought down by the Ghaggar and the width of its dry bed within Bikaner territory; over more than 100 miles it is nowhere less than 2 miles and in places 4 miles or more. This bed is lined on both sides by dunes varying in height ... the Ghaggar bed above Hanumagarh, one notes that the number of mounds marking ancient sites long abandoned is here distinctly smaller than farther down the old river bed ... (mounds) known as ther or theri ... Archaeological facts prove cultivation, and with it settled occupation, to have been abandoned much earlier on the Hakra than on the Ghaggar ... trial excavation at Sandhanawala Ther, 3 miles to the northwest of Fort Abbas ... some serds with incised characters which appear on many inscribed seals from Mohenjodaro and Harappa, chief sites of the Indus Valley cultre ... The great height and sise of several thers indicate prolonged settlement ... the evidence shows that down to historical times the Ghaggar carried water for irrigation under existing climatic conditions much farther than it does now.

This makes it intelligible how the Sarasvati has come in hymns of the Rigveda to be praised as a great river ... upper portion of the ancient bed ... drying up during historical times ... hastened by diversion of flood water for irrigation brought about by more settled conditions and the resulting pressure of population. Lower down on the Hakra the main change was due to the Sutlej having in late prehistoric times abandoned the bed which before had joined the Ghaggar: the resul of a law affecting all rivers whose course lies over alluvial plains ...

Holmes[30] believes that the union of the Sutlej with the Beas (and thence with the Indus) in the West Punjab had already occurred prior to the time of Alexander. It must be assumed that the Nara was continuing to flow as a result of seasonal overspill from both the Indus and the Sutlej, the latter floods using the now dry Ghaggar channel (which is a remnant of the SutlejNara system) ... ''

2.3. Rigvedic(Rk,Rca,or rk) hymns on Sarasvati

The Rigvedic(rk) sources which refer to Sarasvati river are as follows: (there are 72 rks or rica-s which reference Sarasvati; only a few are listed here).

yastE stanah SaSayo yo mayobhUyemnaviSvA pushyasi vAryANi yo ratnadhA vasuvidyah sudatrah sarasvati tamiha dhAtave kah (RV 1.164.49)

Oh Sarasvati offer that breast of yours for our nourishment here which is on your body, which spreads happiness by which you nourish (those who praise you) with all the choicest things, the one which holds all the beautiful things, which knows the enemies' wealth and which offers good gifts.

---

[28] Amal Kar and Bimal Ghose, 1984, *Geographical Journal*, The Drishadvati river system of India: an assessment and new findings, 150: 221229

[29] Aurel Stein, 1942, A survey of ancient sites along the `lost' Sarasvati River, *Geographical Journal*, 99: 173 182:

[30] D. A. Holmes, 1968, The recent history of the Indus, Geographical Journal, 134: 367382: ``.. Lambrick H.T., 1967, The Indus Floodplain and the `Indus' civilization, Geographical Journal, 133,4: 48395.

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sarasvatI tvamasmAmaviDDhi marutvatI jeshi SatrUntyam cicchardhantam tavishIyamANamindro hanti vr-shabham SaNDikAnAm (RV 2.30.8)

Oh Sarasvati you protect us. You who are joined with Maruts, who are a great fighter conquer our enemies. Indra kills that famous and powerful of Shandikas who despised us.

iyam SushmebhirvisaravAyi rujatsAnu giriNAm tavisheb hirurnibhih pArAvatahnImavase suvrktibhih sarasvatI mAr vivAsemadhItibhih (RV 6.61.2)

We serve the Sarasvati who with flames and tides destroyed the peaks of mountains (the fortified towns) like one who plucks lotuses, with good prayers and with good nets for food. [... by her force and her impetuous waves, has broken down the sides of the mountains like a digger of lotus fibres.]

imam me gange yamune sarasvatI Satudri stomamsacatA parushNyA asivanyA marudvrdhe citastayArjIkIye SrNutdyA sushomayA (RV 10.75.5)

Oh Ganga, Yamuna, Sarasvati, Sutudri with Parushni, Marudvridha with Asikni; Arjikiya with Vitasta and Sushnoma hear this praise.

ambitame naditame devitame sarasvati apras'astA iva smas'I pras'astim amba nas krudhi (RV. 2.41.16)

best of mothers ... best of rivers ... give us fame, recognizing that we are without fame. Ascertaining the wishes of the great sages the best of rivers (the Saras vati) incorporated AruNA with her own body; formerly the flow (of the AruNA) was hidden. Afterwards (the Sarasvati) inundated the divine AruNA wih its own waters.

A yat sAkam yaSay vAvaSnAh sarasvati saptathI sindhumAtA yAh sushvayanta sudughah sudhArA abhi svena payasA pIpyanah (RV 7.36.6)

May the seventh (stream), Sarasvati, the mother of the Sindhu and those rivers that flow copious and fertil izing, bestowing abundance of food, and nourishing (the people) by their waters, come at once together.

ekAchetat sarasvatI nadInAm SuchIryati giribhya A samudrAt rAyaSchetantI bhuanasya bhurer ghrtam payo dudue nAhushAya (RV 7.95.2)

Sarasvati, chief and purest of rivers, flowing from the mountains to the ocean, understood the request of Nahusha and distributing riches among the many existing things, milked for him butter and water. [Alone among all rivers Sarasvati listened, she who goes pure from the mountains as far as the sea. She who knows of the manifold wealth of the world has poured out to man her fat milk.]

[``Here we see Samudra used clearly in the sense of sea, the Indian sea, and we have at the same time a new indication of the distance which separates the Vedic age from the late Sanskrit literature. Though it may not be possible to determine, by geological evidence, the time of the changes which modified the southern areas of the Punjab and caused the Sarasvati to disappear in the desert, still the faact remains that the loss of the Sarasvati is later than the Vedic age, and that, at that time, the waters of the Sarasvati reached the sea.''[31]] cf. RV 10.64.9

2.4. Standard device in front of the 'one-horned' heifer on many seals. (Writing system on Sarasvati

[31] cf. Max Mueller, *Sacred Books of the East*, xxxii.60

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hieroglyphs or so-called Indus Script epigraphs)

What was this `standard device' which occurs on Harappan seals `called' in the lingua franca of circa 2500-1700 BC? What does it connote? This leads us into decoding Indus script as Sarasvati hieroglyphs based on the *lingua franca*, mleccha, all related to smithy/mint.

Using the `rebus' principle for decipherment of glyphs is a method that proved successful in deciphering Egyp tian hieroglyphics. This principle has been modified and extended to cope with the Harappan glyphs (e.g. svastika) and other pictorial motifs (e.g. unicorn, `standard device', animals occupying the `field' of the seals with inscribed sign sequences).

What does the 'standard device' look like?

It is a portable device that could be carried with hands aloft the shoulder of the carrier, as evidenced in Harappan tablets where this object occurs also as a field symbol by itself (without the ubiquitous `unicorn'). The structure has two elements.

It depicts a `flow' or a `churning motion' on the upper element. The upper element ends in a tapering, sharp pointed edge as it is rests (or just floats) on the lower element.

The lower element is a bowl which also depicts some `spilling' or `drops' or alternatively, some `smoke or dust' and `dotted droplets'.

Mahadevan calls the structure a `filter' and sees echoes of `soma process.

An alternative view is that this device is a drill and a portable furnace, the lapidary's tools of trade. The upper element looks like a drill used by the lapidary to drill holes in, say, faience beads. The lower element is the stove to bake the inscribed object. The rationale for this interpretation is as follows: The upper element is the sharppointed drill bit depicted with zigzag lines in a churning motion. The lower element is a portable stove depicted with flames or smoke emanating and bits of `drilled' articles depicted with dotted circles around the bowl.

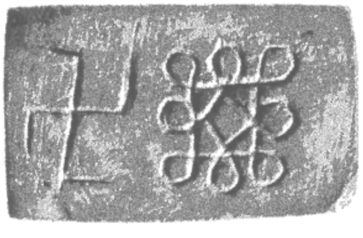
What was the 'standard device' called? What does the homonym 'mean' in Harappan economy?

There is a word in Gujarati (and cognate words of South asian languages which can be semantically clustered) which connotes both a `drilllathe' and a `portable stove'. The word is sangaDi. Rebus: jangaDi is an extraordinarily specific, technical professional term in Gujarati. It connotes an armored guard who accompanies the treasure brought into or taken out of the treasury. A cognate Sanskritized mor pheme is jagada = a guard. cf. also jagati = pedestal.

What does 'svastika' glyph mean, on about 50 epigraphs of the civilization?

Svastika as a glyph related to a smithy/mint

The following are examples of epigraphs of the civilization containing the glyph, 'svastika' which has over 50 occurrences in the corpus of epigraphs. It is notable that the glyph appears on a copper tablet (m1356), a clear indication that the glyph is most likely inscribed in a smithy/mint.



m443Atm443Bt m1356 is a copper tablet The seals m443 and m1356 show the endless knot motif together with the svastika_ glyph. The semantics connoted: **me.rha**, 'twisted; leader, merchant's clerk, **mer.h 'iron'**

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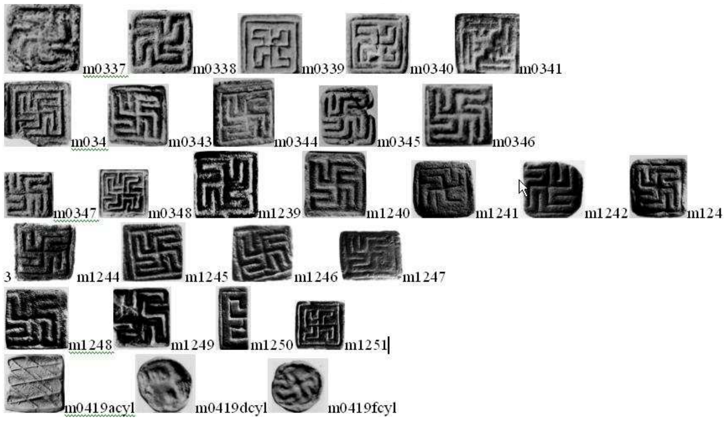
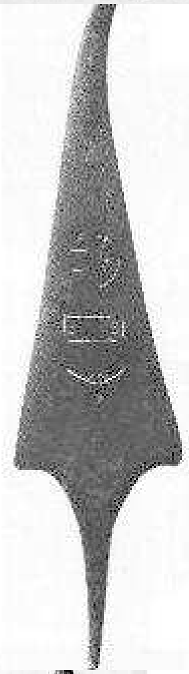
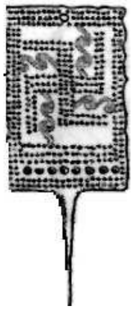
H182A-B tablet in bas-relief (showing on one side five svastika glyphs with alternating arms).

Text of the ep ... ɔle ... together with an elephant or a tiger. The 'svastika' is a pictorial and also a sign Sign 148 Glyph: sathiya_ (Pkt.); rebus: satva 'zinc' (Ka.) Elephant: ib; rebus: ib 'iron'; Tiger: kol; rebus: kol 'pan~caloha alloy of metals'

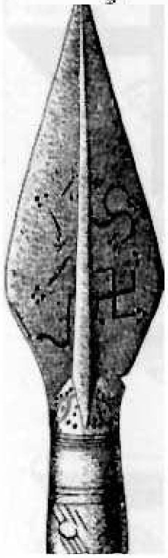




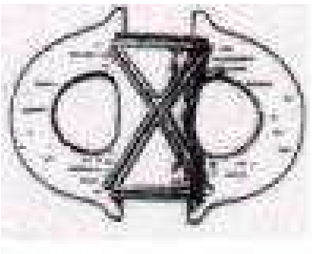
Svastika denotes 'zinc' mineral. (jasta, sattva 'zinc'; rebus: satthya, satthika 'glyph of svastika'). This metallurgical reading is consistent with the other glyphs associated with 'svastika' glyph on epigraphs.

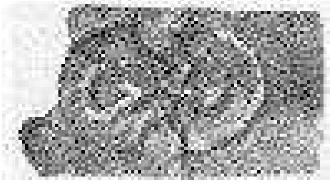


Bronze pin-head from Germany. Spearhead with svastika from Germany (f perhaps



the historical periods show the association of the glyph with bronze tools/weapons.
The inscription on a spearhead is reminiscent of inscribed dagger of Sarasvati civilization from Harappa.





A copper tablet of Mohenjodaro depicts a double-axe identical to the one unearthed in Sumer, Mesopotamia, ca. 3000 BCE Copper from the mines in Rajasthan; was alloyed with tin and arsenic, to yield bronze and brass metals

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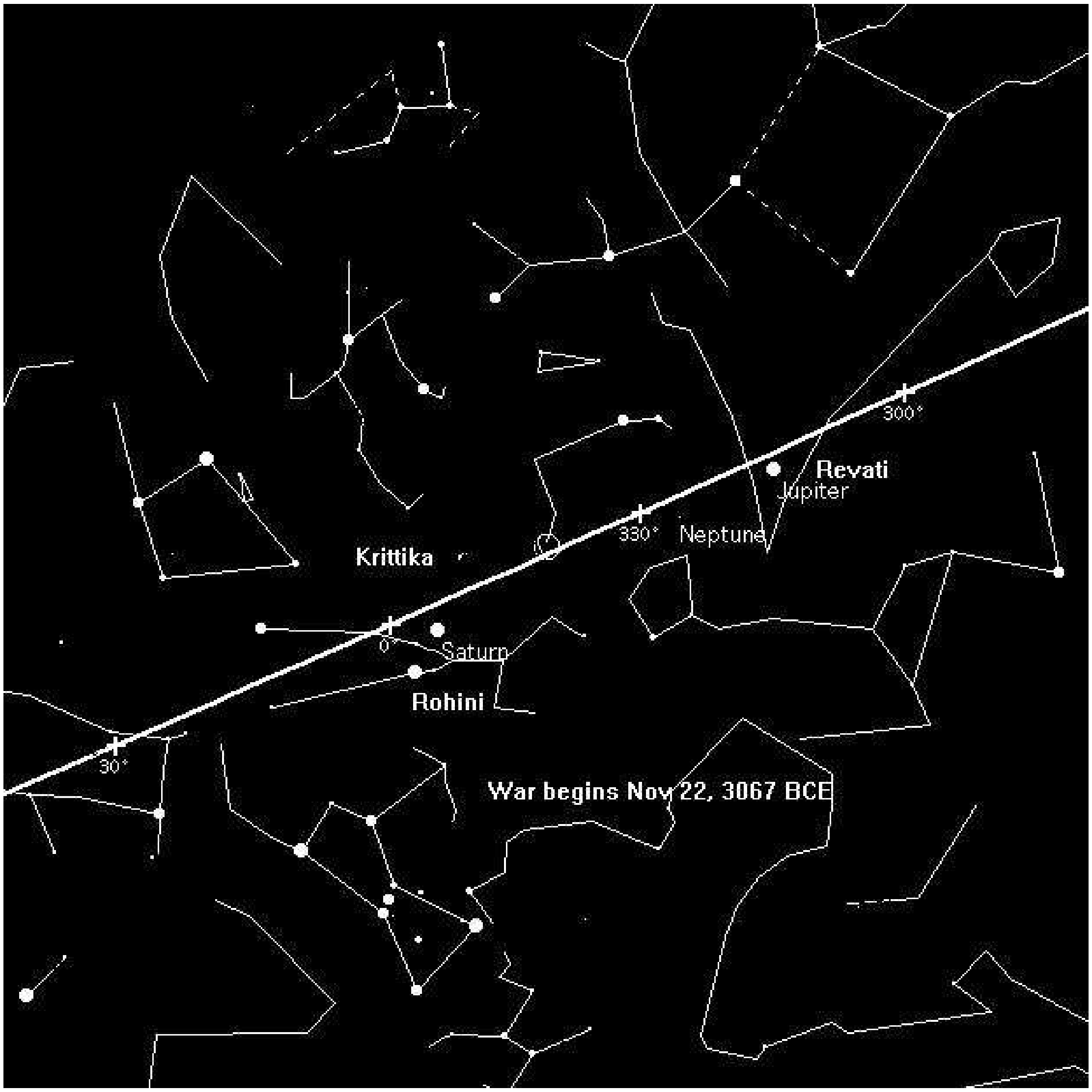
2.5. Sarasvati, Vedic language and cultural traditions

The discovery of over 2000 archaeological sites on the banks of Vedic River Sarasvati and the possibility of identifying Vedic people from new discoveries such as those in Bhirrana provide a challenge to all researchers to unravel the language spoken by the creators of the Sarasvati civilization. I have posited that mleccha was the lingua franca and mlecchita vikalpa was the writing system of the civilization evidenced by nearly 4000 epigraphs containing 'signs' and 'pictorial motifs' -- most of which are hieroglyphs. The resource of an Indian Lexicon providing comparative lexemes from over 25 ancient languages of Bharatam including Vedic provide a framework for testing the mleccha spoken by Yudhisthira in his conversations with Khanaka and Vidura and the mlecchita vikalpa mentioned by Vatsyayana as one of the three arts: 1. des'a bhaashaa jnaanam; 2. akshara mushthika kathanam; and 3. mlecchita vikalpat (correctly interpreted as cryptography). Given the fact that many mleccha word occur in the Vedic texts (words which cannot be explained by Indo-European constructs), it is possible to



provide a framework for language studies of ancient Bharatam and of Vedic times, which integrate language as a medium of cultural expression by a community of speakers, rejecting the language family metaphor. Many ancient texts clearly refer to mleccha as a 'language' or 'dialect'. The framework for a Sarasvati Hieroglyph Dictionary will be presented.

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War starts on Nov 22, 3067 BCE (Saturn in Rohini, Jupiter in Revati). Veda Vyasa recorded observations of sky epigraphs as a calendar of Mahabharata events. As reconstructed using Planetarium Software used by NASA, only one date matches all 150 astronomical observations. *Mahabharata* is the most accurately dated ancient historical document.

2.5.1 Historical chronology and Mahabharata as sheet-anchor of Indian history

The "Mature-Harappan" phase of the civilization is coterminus with the events of the Mahabharata, dated astronomically with remarkable precision. This provides added justification for using mleccha vaacas (as distinct from arya vaacas – grammatically correct speech distinguished from lingua franca) mentioned in the Mahabharata to decode the Sarasvati hieroglyphs (so-called Indus script).

Narahari Achar[32] has demonstrated that the events of Mahabharata occurred circa 3000 BCE based on astronomical references in the Mahabharata which includes a detailed account of Balarama's pariyatra along the River Sarasvati from Dwaraka to Plaksha Pras'ravana (source of River Sarasvati in the Himalayas) which makes the Mahabharata historical accounts coterminus with the mature 'Harappan' phase. [quote] The Date of the Mahabharata War has been determined uniquely to be 3067 BCE, on the basis of archaeo-astronomical investigations using planetarium software and the references to astronomical events found in the epic. As has been emphasized by many scholars, this date should be taken as the 'sheet-anchor' for the chronology of Bharatam. However, the History of India has been written using the dates of Alexander and Megasthenese as fixed points in time and a chronology given on the basis of AIT or some variant there of. These accounts have been repeated so often that they have acquired the status of 'ground-truth'. It is important therefore to reclaim the proper chronology of Bharatam.There are a number of problems in reclaiming the proper chronology. First of all, there are several dates given traditionally as the date of the Mahabharata War. For example there are the dates based on the beginning of Kaliyuga, 3102 BCE on the astronomical basis or 3138 BCE based on the departure of Krishna as per the Bhatavata Purana account. Then there is the date 2449 BCE, attributed to Varahamihira and quoted by Kalhana in Rajatarangini. Further, there is the puranic tradition based on the genealogical lists that there was a period of 1500 years elapsed between Parikshit and the Nandas. These different dates have to be reconciled with the date 3067 BCE. Secondly, the Dates of Buddha, Adishankara and Kalidasa should be taken as fixed points in the chronology. Here an attempt is made to reconcile the differences in the so-called traditional dates of the Mahabharata war, based on the textual evidence in the epic itself. Preliminary results based on archaeoastronomical investigations into the date of Buddha as recorded in *Samyutta Nika_ya* indicate the emergence of a consistent chronology. Work is in progress to reexamine some epigraphical evidence using planetarium software. The author is confident that a completely consistent chronology will emerge with the date of Mahabharata war as the sheet-anchor. [unquote]

[32] http://sarasvati96.googlepages.com/reclaimingthechronologyofbharatam:narahariachar(july2006)

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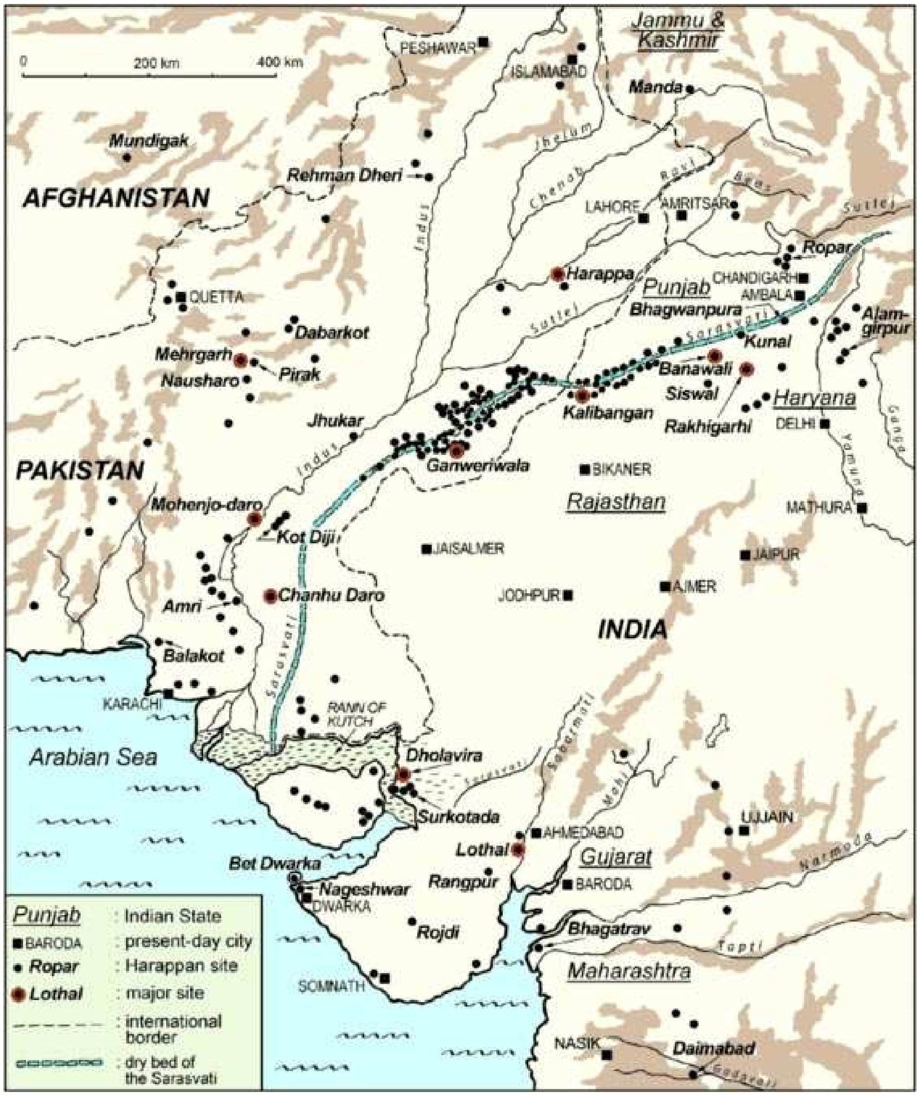
Achar establishes that some references are emphatically to comets (mentioned as such in the text itself; graha means both 'planet' and 'comet' and has to be interpreted in context). This brilliant insight resolves the centuries' old problem of apparent inconsistencies within the critical edition of the text. In fact, there are no inconsistencies. Mahabharata is astonishingly accurate, making it the most authentic historical document in human civilizational history.

Continuing the path-breaking use of planetarium software (of the type used by NASA to launch satellites for probe missions into cosmos), Achar also validates the date of Nirvana of the Buddha. This date is consistent with the Tibetan Bauddha tradition which notes that Gautama the Buddha lived in 19th century BCE. The skymaps of the 3067 and 1807 BCE map the important dates in Hindu civilization: the Great War and the Nirvana of the Buddha, respectively.

The late Dr. Raja Ramanna, nuclear scientist, who presided over the Jan. 2003 colloquium noted that the astronomical references in the Mahabharata were observed events (not computed as a panchanga). Methinks, Achar has already achieved the reclaiming of the chronology for two key dates of hindu civilization, with clinching, reproducible evidence of planetaria software. Now, it is time to depict these skymaps on planetaria all over the world for viewers to see the methods of most accurate dating of events in history of civilizations. Of course, researches will continue to re-visit the identification of Sandracottas. Given the duplicity of William Jones (now appearing with a skull-cap on a marble panel on a chapel at Oxford College), the assumptions made by indologists about Greek sources have to beverified, again. As Reagan said about Russian missiles' reduction: trust, but verify.



2.5.2 Focus and locus on writing system *and lingua franca*

This section is a brief overview of the information recorded on 13

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volumes[33]– related to Sarasvati (Indus) civilization, writing system and lingua franca.

Epigraphica Sarasvati (Sarasvati hieroglyphs or Indus script) was created ca. 4000 years before present by artisans of Sarasvati civilization. Ancient miners and metallurgists who invented metals and alloys of metals also invented a writing system, called, mlecchita vikalpa. Indus script encodes mleccha speech. The hieroglyphs detail competence of the artisans and their possessions: minerals, metals, alloys, smithy, furnaces, forge, smith's workshop, mint.

The focus is on the early writing system commonly referred to as *Indus Script* and an early lingua franca called *mleccha*. The locus is Sarasvati River basin since about 80% (2000 of the 26000) of the civilization archaeological sites are located on this River basin. Sarasvati is a great river of Vedic times.

The quintet in five volumes has, therefore, been called: *Indus script encodes mleccha speech.*

The work is presented in five volumes.[34]

This is a tribute to ancient artisans. Two revolutionary civilizational discoveries occurred in the 3rd millennium BCE: one was the technique of alloying metals and the second was the invention of a writing system.

The work in 5 volumes, *Indus script encodes mleccha speech* proves the validity of the insight provided by Prof. James D. Muhly[35]: "The Early Bronze Age of the 3rd millennium BCE saw the first development of a truly international age of metallurgy... The question is, of course, why all this took place in the 3rd millennium BCE.. It seems to me that any attempt to explain why things suddenly took off about 3000 BCE has to explain the most important development, the birth of the art of writing... As for the concept of a Bronze Age one of the most significant events in the 3rd millennium was the development of true tin-bronze alongside an arsenical alloy of copper..." The emergence of the Iron Age (c. 1000 BCE)…'The simplicity of iron-working took metallurgy out of the palace, just as the alphabet had done for the art of writing.' [36]The fabrication of bronze represented man's first industrial revolution centering in the use of fire..."[37]

An exquisite example of metallurgy in Sarasvati civilization. The bronze statue of a woman wearing bangles and holding a small bowl in her right hand, Mohenjo-daro.[38] Same cire perdue (lost wax) technique is followed even today by

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[33] Posted also as ebooks at http://sarasvati97.blogspot.com/

[34] Author: S. Kalyanaraman, 2008, Sarasvati Writing System, mlecchita vikalpa (1/5)A dictionary of Sarasvati hieroglyphs (2/5)Epigraphica Sarasvati (3/5)Sarasvati lingua franca, mleccha (4/5)Indian Lexicon (5/5)

[35] J.D. Muhly, 1973, Copper and Tin, Conn.: Archon., Hamden; Transactions of Connecticut Academy of Arts and Sciences, vol. 43, p. 221f.)

[36] James D. Muhly, Mining and metalwork in ancient Western Asia, p. 1517 in: Jack M. Sasson, ed., 1995, *Civilizations of the ancient Near East*, New York, Charles Scribner's Sons, pp. 1501-1521."

[37] .Theodore A. Wertime, The search for ancient tin: the geographic and historic boundaries, in: Alan D. Franklin, Jacqueline S. Olin and Theodore A. Wertime, eds., 1977, The Search for Ancient Tin, Washington D.C., US Government Printing Office; See Theodore W. Wertime, In search of Ana_ku, bronze-age mystery, Mid-East 8, May-June 1968, pp. 10-20; J.D. Muhly, Tin trade routes of the bronze age, American Scientist 61, July-August 1973, pp. 403-13.

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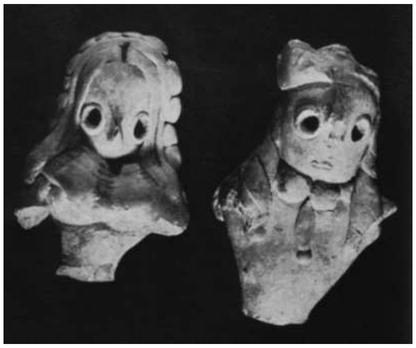
vis'vakarma creating bronze or pancaloha murti-s in Swamimalai on the banks of River Kaveri.
An indicator of cultural continuum is the abiding reverence for mother divinity in Hindu civilization.
A metaphor for Sarasvati river is kumbha. Sarasvati_. The legend shown on Bhita sealing, together with a ghat.a. Indian Museum, Calcutta No. A. 11254-NS. 1958 The association of Sarasvati_ with a ghat.a, water-pot is significant and relates to River Sarasvati_.

Bronze foot of a lady wearing a bronze anklet: Mohenjo-daro [After fig. 5.11 in: DP Agrawal, 2000]

2.5.3 Va_k is Sarasvati

Gopatha Bra_hman.a (2.20) states that worship of Sarasvati_ pleases Va_k, because Va_k is Sarasvati_: atha yat sarasvati_m yajati, va_g vai sarasvati_ va_cam eva tena pri_n.a_ti. The very institution of the yajn~a itself which is identified with the gods is also identified with Va_k (TB 1.3.4.5: atho praja_pata_v eva yajn~am pratis.t.ha_payati praja_patir hi va_k; TB 16.5.16: va_g vai sarasvati_ va_g vairu_pam vairu_pam eva smai taya_ yunakti; Sa_yan.a's commentary: va_k s'abda_tmika_ hi sarasvati_ vairu_pan~ ca va_ksamatutam; Sarasvati_ is speech in the form of sound (s'abda or dhvani); the word 'ru_pam' suggests a number of forms of speech; vairu_pam is the object denoted by speech). S'atapatha Bra_hman.a states that Sarasvati_ is speech and speech itself is sacrifice. (S'B 3.1.4.9,14). Sarasva_n is identified with mind and Sarasvati_ with Va_k. (sa_rasvatau tvo tsau pra_vata_m iti mano vai sarasva_n va_k sarasvaty etau: S'B 7.5.1.31; 11.2.4.9, 6.3). Sarasvati_ is pa_viravi_ (RV 2.1.11; AB 3.37); this is interpreted as s'odhayitri_ or as purifying; or, as sound created by a spear or lance (pavi_ra) or Indra's thunderbolt. [pa_viravi_ = a_yudhavati_]. Sarasvati_'s connection with the mind and the cow (beneficial yield) led her giving full inspiration (dhi_) to compose hymns, and, consequently, she became the goddess of wisdom.[39] In the Brahma_n.d.a Pura_n.a (4.7.27), Sarasvati_ is described as one of the nine Ma_tr.kas accompanying Lalita_ in her fight with Bhan.d.a_sura.
A figurine from Mehrgarh, c. 3000 BC. (Musée Guimet, Paris)
Mehrgarh figurine. [40]



http://upload.wikimedia.org/wikipedia/en/thumb/c/c4/Mehrgarh_figurine3000bce.jpg/180px-Mehrgarh_figurine3000bce.jpg
River divinity from Begram. Ivory. 47 cm. tall. Kabul museum. [41]

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[38] (DK 12728; Mackay 1938: 274, pl. LXXIII, 9-11)
[39] J. Gonda, *Pu_s.an and Sarasvati_*, p. 10; Book Review, *JRAS*, 1986, no. 1, pp. 120-21.
[40] http://www.razarumi.com/documents-archive/story-of-a-painting-mehrgarh-indus-and-ghalib/ Kabul Museum: Gallery B, #1http://www.mythinglinks.org/eurasia~Afghanistan2.html

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Mother goddess figurines, right, from Mundigak, left, from Deh Morasi Ghundai, 3rd Millennium B.C. (h. 5cm) [42]
Mother divinity. Zhob, Baluchistan.
Mohenjodaro. Divinity figurines. Mother Goddess (fertility divinity), derived from the Indus Valleytradition, terracotta Sar Dheri, Gandhara, 1st century BCE. [43]

afield, gold

"Most of the raw materials used by the Harappan Civiliza- tion were available from not-too-distant sources: copper from Rajasthan, semiprecious stones from the region of the Narmada River and Badakhshan. Farther may have come from the south of the peninsula; but as yet little research has been done on the nature of intra-Indian trade at this time. To the west of the Indus Plain, villages such as those revealed at Kulli and Nindowari continued to experience "Indianization," though they retained their individuality, and may still have played a role in the diminishing overland trade. But the height of the civilization brings maritime commerce briefly into its own, as the fortified outpost at Sutkagen Dor on the Makran Coast shows. (Lothal in Saurashtra has frequently been cited as a port; but, since technical considerations precluded the large basin there [plate II.4, fig. 8] having served as a dock-yard, this identification lacks evidence.)

2.5.4 Linguistic area of Sarasvati Civilization

A major challenge in establishing the continuity of the Bha_rati_ya civilization beyond ca. 1300 BCE is the as yet unresolved problem of decoding inscriptions of the Sarasvati-Sindhu civilization (or, the so-called decipherment of Indus Script).

2.5.4.1 Justification for the use of rebus method

Through a number of monographs, superb structural analyses of the inscriptions have been done by both Parpola and Mahadevan. The analyses point to the use of most of the Signs as representing 'nouns' or '*res*, things'.

The use of the rebus method is justified on the following evidence and analysis:

The pictographs to which 'sound-bites' are tagged, as keys to the process of decoding the inscriptions, cover a wide range and number of inscribed objects as shown by the following frequencies (out of 13,372 occurrences of Signs and over 100 pictorial motifs (the frequencies are only indicative numbers, hence, approximate and are subject to change as the orthography of many pictographs and Signs get more precisely identified).

Hieroglyphs and frequencies of occurrence on epigraphs

[41] http://www.mythinglinks.org/eurasia~Afghanistan2.html
[42] http://www.afghanan.net/afghanistan/prehistory.htm
[43] http://en.wikipedia.org/wiki/User:PHG

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One-horned heifer with a pannier	1159 + 5 (with two horns)
Shor-horned bull	95 +2 (in opposition)
Zebu or Bra_hman.i bull	54
Buffalo	14
Elephant	55 + 1 (horned)
Tiger (including tiger looking back)	16 + 5 (horned)
Boar	39 + 1 (in opposition)
Goat-antelope	36 + 1 (flanking a tree)
Ox-antelope	26
Hare	10 +1 (object shaped like hare)
Ligatured animal	41
Alligator	49
Fish	14 (objects shaped like fish); fish also a Sign
Frog	1
Serpent	10
Tree	34 + 1 (leaves); leaf is also a Sign **kut.i 'tree'; rebus: kut.hi 'smelter furnace'**
Dotted circle	67 **ghan:ghar ghon:ghor** 'full of holes' (Santali); rebus: **kan:gar** 'portable furnace (K.)
Svastika	23 rebus: **satthiya_** 'dagger, knife' (Pkt.) **satva** 'zinc' (Ka.)
Endless-knot	4
Double-axe	14 (inscribed objects shaped like axe)
Standard device (lathe, portable furnace)	19
Rimmed narrow-necked jar	1395
Fish Signs	1241
Leaf Signs	100
Nave of spoked wheel	203
Cart frame + wheels	26
Sprout (or, tree stylized)	800
Water-carrier	220
Scorpion	106
Claws (of crab)	130 + 90 (shaped like pincers)
Arrow (spear)	227
Rimless, wide-mouthed pot	350

Frequency range	No. of Signs	Total Sign occurrences	Percentage	Cumulative percentags
1000 or more	1	1395	10.43	10.43
999-500	1	649	4.85	15.28
499-100	31	6344	47.44	62.72
99-50	34	2381	17.81	80.53
49-10	86	1833	13.71	94.24
9-2	152	658	4.92	99.16
Only once	112	112	.84	100.00

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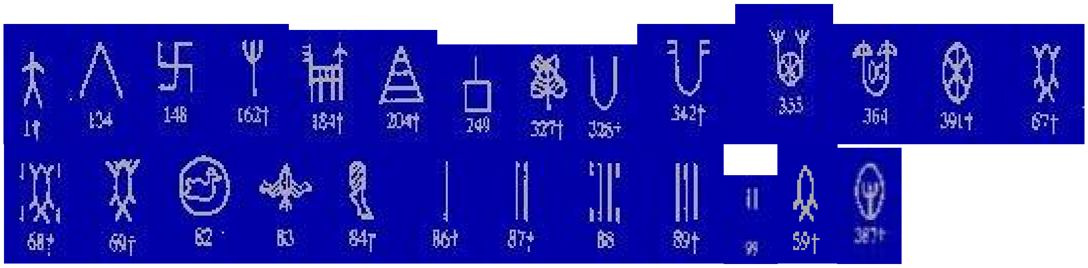
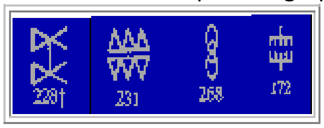
Only 67 Signs account for a total of 80.53 percent of all occurrences of Signs on inscribed objects.[After Mahadevan 1977: 17].

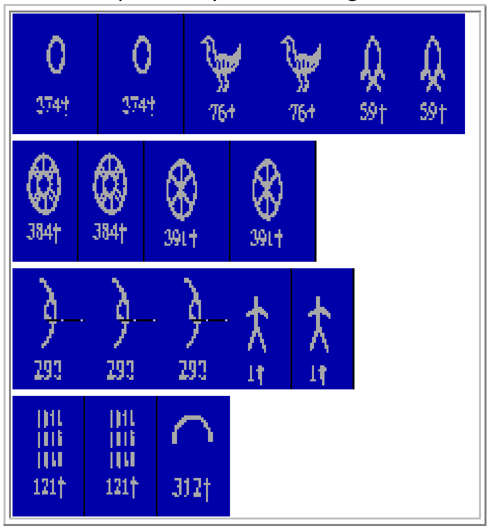
Some examples from Hieroglyph Sign List showing the glyptic nature of writing: (After Mahadevan)



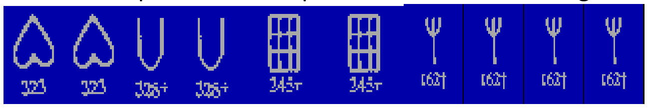
Mirror-reflected pairs of graphemes



Mahadevan notes, "Compounds of mirror-reflected pairs. A rather curious feature of the script is the occurrence of mirror-reflected pairs as bound Signs." (Mahadevan, 1977, p. 16) He adds that the mirror-reflected pairs may have the Sign doubled on the horizontal or vertical axis.

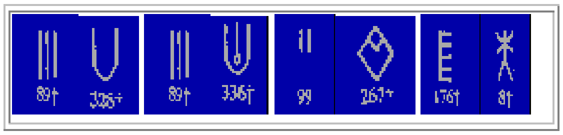


There are also paired or re-duplicated occurrences of Signs.



There are some stable sequences of Signs in inscriptions, stability being measured by the frequency of occurrence of two Signs within each inscription.

The following seven pairs have between 93 and 291 occurrences in the inscriptions.



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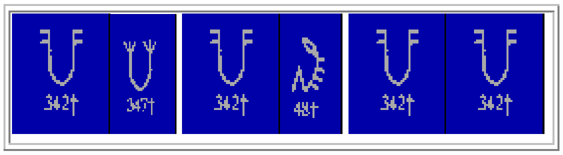
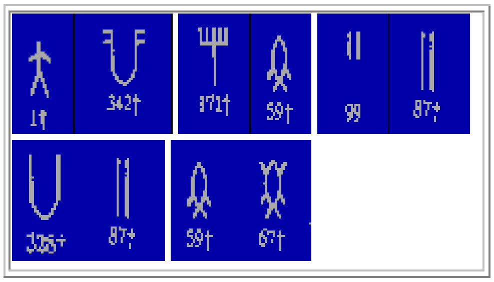
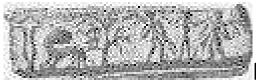


There are five pairs with between 65 and 87 occurrences in the inscriptions.



There are many ligatured Signs:

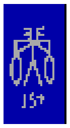
An inverted ‘v’ (symbol of ‘lid’) is ligatured on Signs 65, 66, 75 (fishes), Sign 163 (corn sheaf), Sign 138 (cross-road), Sign 334 (pot). This inverted ‘v’ is also ligatured on a jar pictorial – like a lid on the rim of the narrow-necked jar. (Fig. 111 field symbol, Mahadevan corpus).

FS111

The 'jar' Sign is also ligatured (infixed) with short linear strokes.

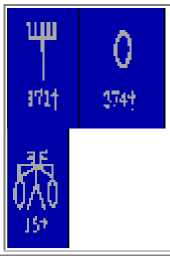
Ligatured Signs appear together with pictorials in inscriptions.

Thus, Fig. 97 Mahadevan.

This composition is a combination of three pictorials – bull, trough, standing person with upraised arm -- and the Sign: 

The person standing in the middle seems to point with one hand at this Sign and at the 'trough' with the other hand, seemingly conveying both 'trough' and the ligatured Sign 15 which is a composition of the 'jar' and 'the water-carrier' representions.

A characteristic feature of the use of graphemes in the inscriptions is ‘ligaturing’.

		The ligaturing pattern is extended further in Sign 418: Sign 15 is further ligatured with a harrow (Sign 171) and oval (Sign 374).

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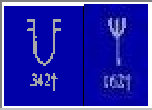
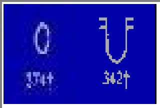
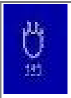
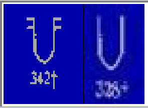
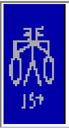
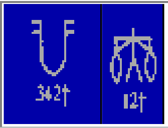
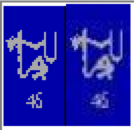
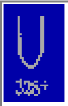
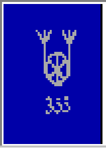
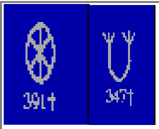
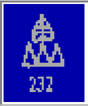
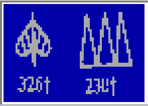
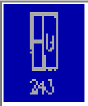
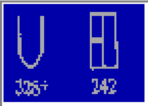
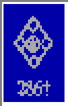
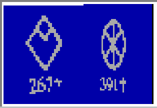
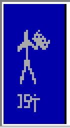
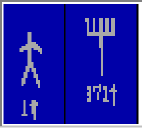
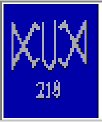
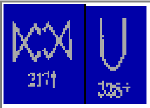
		Sign 352, jar + corn sheaf (On Sign 352 the rim of jar is represented by = and also corn sheaf glyph.)
		Sign 394, jar and oval
		Sign 353, rim of jar and wide-mouthed, rimless pot
		Sign 15 itself seems to be a ligature of Signs 12 and 342
		Signs 45/46 (seated person) seem to ligature the pictorial of a kneeling-adorant with Sign 328
		Sign 355 seems to ligature Sign 347 and Sign 391
		Sign 232 seems to be a ligature of Sign 230 and Sign 326
		Sign 243 seems to ligature Sign 242 and Sign 328
		Sign 286 seems to ligature Sign 267 and Sign 391
		Sign 19 seems to ligature Sign 1 and Sign 171
		Sign 218 seems to ligature Sign 217 and Sign 328

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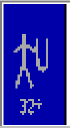
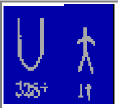
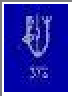
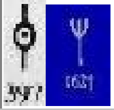
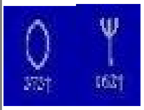
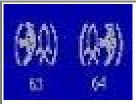
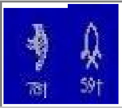
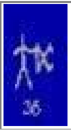
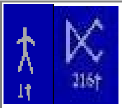
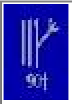
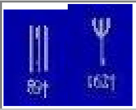
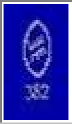
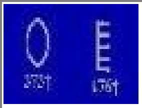
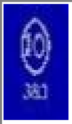
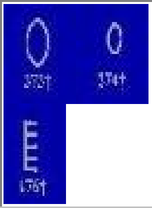
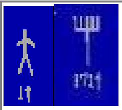
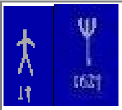
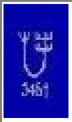
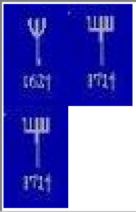
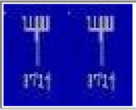
		Sign 32 seems to ligature Sign 1 and Sign 328
		Sign 372 is a three-fold ligature with Signs 397 and 162
		Sign 387, corn sheaf within an oval Ligature of Sign 162 and Sign 373 yields Sign 387.
		Signs 63 and 64, bird and fish
		Sign 36, man and pincers
		Sign 90, three linear strokes and corn sheaf
		Sign 362, oval and comb
		Sign 383 ligatures Signs 374, 373 and 176
		Sign 19, man and harrow
		Sign 21, man and corn sheaf
		Sign 348 ligatures with Sign 162 and a pair of 172 (See paring in Sign 173)
		Sign 173 is a ligatured representation of a pair of the Sign 172.

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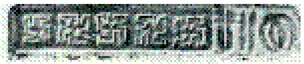
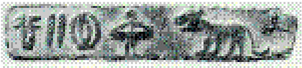
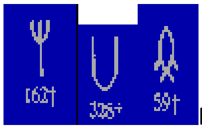
Tablet in bas-relief



 H182

On this tablet the repetition of the 'svastika' Sign sequence five times points the possibility of the'svastika' Sign denoting an 'object or thing.'

Each of the Signs (162, 325 and 59) seems to denote an ‘object’, and is frequently preceded by ‘numerical strokes’.
Sign 372 (‘oval’ grapheme) ligatures with Sign 162, yielding Sign 387

The frequencies in parenthesis are based on Mahadevan conordance (which excludes objects that do not contain a 'Sign'); the actual numbers will be higher based on the more comprehensive Parpola photo corpus which includes inscriptions containing only pictorials.

Media types with inscriptions

Seals (1814)
Tablets (in bas-relief or inscribed) (511)*[including Seal Impressions]
Miniature tablets (of stone, terracotta or faience) (272)
Copper tablets (plates) (135)
Bronze implements/weapons (11)
Seal Impressions*
Pottery graffitii (119)

Ivory or bone rods (29)
Inscribed on stone, bracelets (or, bangles), Ivory plaque, Ivory dice, Carnelian tablet, Terracotta ball, Brick (15)
Display-board (Dholavira or Kotda with 10 Signs, possibly atop a gateway) (1)

Stone celt (Sembiyan Kandiyur) (1)

Almost all the miniature tablets are from Harappa; almost all copper tablets are from Mohenjodaro. An inference is that the miniature tablets served the same function as the copper tablets which evidence repetitive messages or Sign sequences.

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Considering that the epigraphs of Sarasvati Civilization are dated between 3300 BCE (the early potsherd with writing found at Harappa) to 1400 BCE (the 'jar' seal found at Daimabad), the remarkable stability of the writing system in a vast area is concordant with the remarkable stability of the dialects which can be traced in a continuum from the substratum languages evidenced in lexemes of Bharatiya languages such as Nahali, Gujarati, Kannada, Telugu. Masao Noguchi of Tokai University, Japan has provided a typological analysis of the handles of square seals mostly from Harappa and Mohenjodaro to unravel a chronological sequence. He echoes the views of Bisht who notes that Type Ib seals with no 'signs' but only 'mythological scene, an animal, or a structure motif' have been found in layers pre-dating the Sarasvati Civilization in the excavations at Dholavira. He also notes a westward spread of the cultural styles evidenced by the seals and adds that "some Central Asian cultural elements spread westward from Baluchistan, and one of these elements appeared in the "Central Asian style" seal (Gotoh 1999) in the western area of the Indus plain during the Mehrgarh VII period." [44]

The epigraphs point to a westward movement of Bharatiya into BMAC region apart from trade contacts across the Persian Gulf with the Mesopotamian region.

The archaeological evidence, which has a bearing on the search for language(s) of the civilization, is summed up succinctly by Kenoyer: "The origins of the Indus urban society can be traced to the socio-economic interaction systems and settlement patterns of the indigenous village cultures of the alluvial plain and piedmont. More importantly, the factors leading to this transformation appear to be autochthonous and not derived from direct stimulus or diffusion from West or Central Asia." (Kenoyer, J.M., 1991, Urban process in the Indus traditon. [45]

2.5.5 Sites where evidences of Sarasvati writing system were found

The site names and abbreviations used:

Major sites M Mohenjodaro H Harappa L Lothal K Kalibangan C Chanhujo-daro B Banawali Rhd Rahman-dheri Pk Pirak Minor sites Agr Alamgirpur Amri Amri Ch Chandigarh Dmd Daimabad Dlp Desalpur Dlv Dholavira (Kotadi, Kotda-Timba) Hls Hulas	Jk Jhukar Krs Khirsara (Khera-shara, Netra) Lh Lohumjo-daro Msk Maski Mehi Mehi Pbm Pabumath Pbs Prabhas Patan (Somnath) Rgr Rakhigarhi Rgp Rangpur Rhr Rohirah Rjd Rojdi Rpr Rupar (Ropar) Sht Shahi-tump Sktd Surkotada Tkwd Tarkhanewala-dera	Ad Allahdino (Nel Bazaar) Ai Amri Blk Bala-kot Grb Gharo Bhiro (Nuhato) G Gumla Hd Hissam-dheri Kl Kalako-deray Kd Kotdiji Lwn Lewan-dheri (Dar Dariz) L III Loenbar III Mr Mehrgarh Nwd Naru-Waro-daro Ns Nausharo Nd Nindo-wari-damb	Pg Periano-ghundai Skh Sarai Khola Sb Sibri-damb Trq Tarakai Qila Ukn ProvenanceUnknown West Asian sites Djoka (Umma) Kish Susa Telloh Ur Ukn (Prob. from W. Asia)

[44] http://bosei.cc.u-tokai.ac.jp/~indus/english/thesis01e.html (March, 2003).
[45] A preliminary model from Harappa, in: Richard H. Meadow ed., *Harappan excavations 1986-1990*, Madison, Wisconsin: Prehistory, p. 11.

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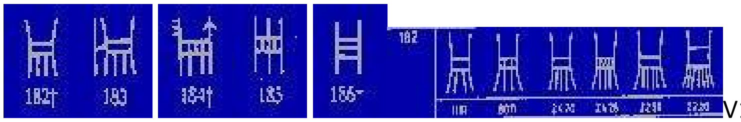
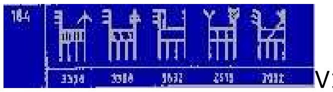
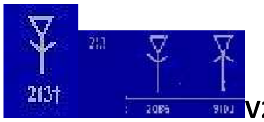
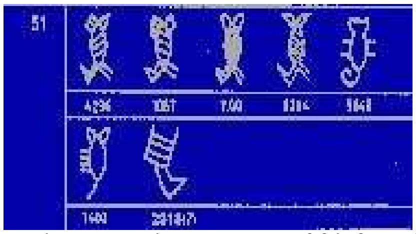
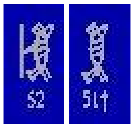
The Sign list used, in a perspective snapshot presents a number of variants and ligatures which reinforce the hieroglyphic nature of orthography and a unique use of ligatured glyphs.

V182 V184

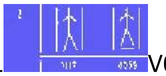
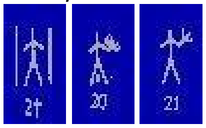
These are examples of 'signs' which are derived from the 'antelope' glyph. It is notable that Sign 182 occurs repeatedly on copper plate epigraphs. The first variant on the left of variants of Sign 184 demonstrates this. The ligature of a tail is characteristic both on this sign variant and on pictorial motifs which depict an 'antelope'

**V213**

Sign 213 could be derived from the pictorial motif of 'standard device' normally shown in front of a one-horned heifer. sangad.a 'gimlet'; Rebus: sangad.a 'portable furnace'

Sign 51 may be identified as a 'bandicoot, rat' seen from the back as shown on the variant on fifth from left.
kod.el 'rat' glyph may be rebus for kol.el 'smithy': kole.l.

V001 V002  As Signs 20 and 21 demonstrate, the 'body' glyph gets ligatured with other glyphs which occur independently as hieroglyphs. Such ligatured glyphs have to be read by isolating and identifying the ligaturing elements and reading each element rebus.

and.ren (pl. and.ran) male, man (Pe.); and.ra a male animal or bird, male (Kui); an.d.ra_ male (said only of animals)(Kur.); an.d.ya_ fierce, unmanageable (of bulls, bullocks, and male buffaloes)(Kur.); an.d.ya a bull (Malt.); an.d.i_ra male (Skt.); an.d.ira_ id. (Or.)(CDIAL 1111; DEDR App. 7). Rebus: aduru 'native metal'.

There are sets of lexemes with homonyms for these glyphs: med. 'body'; man.d.i 'kneeling'; rebus: med. 'iron'; man.d.a_ 'workshop' (Kon.) Vikalpa: **t.ha_t.hum** = a frame-work, the body (G.) Rebus: **t.hat.era** = a brazier, a caste who manufacture and sell brass ware; t.hat.ori = a worker in brass, a goldsmith (Santali) Thus, the glyph is a homograph for the buffalo horns 'ta_tta_ra'.

Sign 8 (105)
A variant of Sign 8 is a horned, standing person ligatured to the buttocks of a bull. **d.hagara_m** = pl. the buttocks, hip (G.) Rebus: **d.han:gar** = blacksmith

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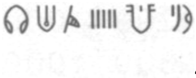
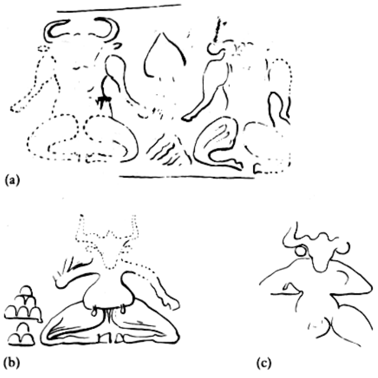
m1224A m1224B m1224 m1224e Pict-88 1227



4319 Standing person with horns and bovine features (hoofed legs and/or tail).



Buffaloes sitting with legs bent in yogic a_sana. Susa Cc-Da, ca. 3000-2750 BC, proto-Elamite seals: (a-c) After Amiet 1972: pl. 25, no. 1017 (=a); and Amiet 1980a: pl. 38, nos. 581-2 (b-c)

Buffalo-horned divinity. Painting on a jar. Kot Diji. C. 2800-2600 BCE [After Khan 1965, pl. XVIIb; cf. Fig. 2.25 in JM Kenoyer, 1998, *Ancient cities of the Indus Valley Civilization*, Karachi, Oxford University Press].

http://www.heritage.gov.pk/html_Pages/history1.html

tha_tha_ra 'buffalo horns' (Munda); rebus: **t.hat.hera** 'brassworker'.

mu~he~ = face; rebus: **mu~ha_** = quantity of iron smelted at one time in the earthen furnace of the Kolhes (Santali)

kad.a buffalo (Santali); Rebus: **kad.iyo** [Hem. Des. kad.a-i-o = Skt. sthapati a mason] a bricklayer; a mason (G.)

2.5.6 Sarasvati Writing System, mlecchita vikalpa

Sarasvati writing system -- Mlecchita vikalpa encodes speech, mleccha speech. It is *mlecchita vikalpa* (an alternative system of rendering in writing, the lingua franca, *mleccha*). Mleccha may be called the substrate language of all Indian languages. (Mlecchita vikalpa is a phrase used by Vatsyayana).

For a background reading on Indian languages, bhasha, and legacy of Sarasvati writing system, see Sarasvati *lingua franca*, mleccha (Mleccha is a lexeme used in S'atapatha Brahmana and in Mahabharata).

2.5.6.1 Objective: Cracking the code of Indus Script; cryptography unravels, validates Mahabharata reference on *mleccha* and Vatsyayana's reference on *mlecchita ikalpa*

Over 150 attempts at decipherment have contributed to advancing the understanding of the writing system and every one of the decipherers has provided insights into unraveling the tough nut to crack. We are beholden to these savants for the contributions made by them to understand the messages left behind by our ancestors who created the most extensive civilization of their times. The apparent failure of over 150 decipherments of Indus Script announced so far is principally due to 1) non-recognition of signs and pictorial motifs as hieroglyphs and 2) non-recognition of mleccha as Language 'X'. These two deficiencies have been substantially remedied in this work and over 90% of all glyphs of nearly 4000

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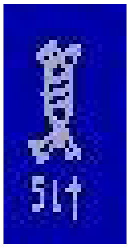
epigraphs read rebus using the substratum lexemes of all Indian languages, Munda, in particular and repertoire of smithy and mint, in particular.

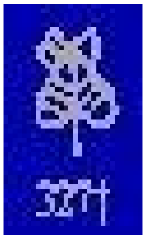
Here's an interesting news item. For example, the practice of writing names of 'seal' owners was noticed only in the 9th century BCE in Israel. It is a tall assumption to start looking for names of people on Sarasvati hieroglyphs, even though some early cylinder seals from Mesopotamia do contain names of persons after the practice of writing in cuneiform script got introduced. Thousands of earlier cylinder seals contain only glyphs without any cuneiform inscriptions. It is possible that some of these glyphs may be explained as comparable to Sarasvati hieroglyphs; this has to be further investigated. The practice so far has been only to explain these glyphs in heraldic terms and assuming the glyphs to be insignia of royalty. [quote] Etgar Lefkovits , THE JERUSALEM POST Feb. 28, 2008 An ancient seal bearing an archaic Hebrew inscription dating back to the 8th century BCE has been uncovered in an archeological excavation in Jerusalem's City of David, the Israel Antiquities Authority announced Thursday. The find reveals that by 2,700 years ago, clerks and merchants had already begun to add their names to the seals instead of the symbols that were used in earlier centuries. The state-run archeological body said the seal, which was discovered near the Gihon Spring in the City of David outside the walls of the Old City, bears the Hebrew name Rephaihu (ben) Shalem, a public official who lived in the Jerusalem neighborhood during this period. The excavation, which is being carried out by Haifa University Professor Ronny Reich and Eli Shukron of the Israel Antiquities Authority, also uncovered pottery shards that date back to the Iron Age 2 (8th century BCE), which they used to date the seal, as well as fragments of three bullae, or pieces of clay that were used to seal letters or goods. The discovery revealed an interesting development in the ancient world: whereas during the 9th century BCE letters and goods were dispatched on behalf of their senders without names, by the 8th century BCE the clerks and merchants had already begun to add their names to the seals, the archeologists said. "In contrast with the large cluster of bullae that was found two years ago, in which all of its items contain graphic symbols [such as a boat or different animals - fish, lizards and birds] but are of an earlier date [end of the 9th-beginning of the 8th century BCE], the new items indicate that during the 8th century BCE the practice had changed and the clerks who used the seals began to add their names to them," Reich said. [unquote] This find in Gihon Spring is relevant in the context of two tin ingots found in a shipwreck at Haifa with Sarasvati hieroglyphs (discussed in this work in a separate section).

Cryptography employing nearly one thousand hieroglyphs (depicted on about 4000 inscribed objects) validates the reference to mleccha in the Great epic, *Mahabharata*, which is the sheet-anchor of ancient Indian itihaasa. In this text, Yudhishthira converses with Khanaka (the miner) and with Vidura in mleccha language. The crypt alo validates the reference in *Kamasutra* by Vatsyayana while discussing about vidyaasamuddes'a of 64 arts and mention of mlecchita vikalpa (writing system of copper-workers), des'abhaashaa jnaana and akshara mushthika kathana (messaging through finger-wrist mudra).

The underlying language is emphatically proto-Indian which will become apparent as the evidence gets marshaled and presented in this work, glyph after glyph, lexeme after lexeme – both matched on the basis of a sound theoretical/methodological framework: rebus related to only one category: repertoire of smithy and mint. It is simply astonishing that just this one category provides about 2000 ancient lexemes and explains virtually the entire crypt on nearly one thousand hieroglyphs (signs + pictorial motifs – glyphs read and the substantive messages read rebus), thus unraveling almost the entire corpus of messages conveyed by over 90 % of the inscribed objects.

2.5.6.2 The argument





Two special ligatured glyphs are read rebus: kole.l 'smithy' and kampat.t.am 'mint'

The ligatured **kod.el** 'rat' glyph may be rebus for kol.el 'smithy': kole.l (That the glyph is a 'rat' – a seated bandicoot seen from the back -- may be

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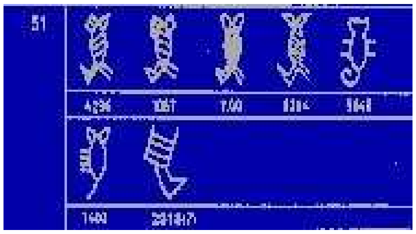
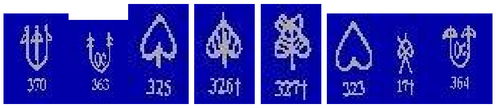
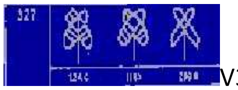
surmised from the variants of Sign 51 shown below, the variant on Text 9845, in particular.)

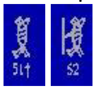
The ligatured kamar.kom 'ficus' glyph may be rebus for 'mint': kampat.t.am

In the entire corpus of hieroglyphs, these are the only two glyphs with characteristic ligatures on top: one is a leaf and the other is what looks like the back of a field-rat.






V327

[Is it a bird or an India River Otter? Could it be a scorpion's tail/sting ligatured to a field-rat, a model for Signs 51 and 52? It is a rat, a bandicoot.]  See variant in Text 9845 West Asia find]
(Sign 51 itself is ligatured with special markers on top comparable to the markers ligatured on Sign 327) This connotes, **bica** 'scorpion'; bica, 'ore'? Or, **kod.el**, 'rat'; rebus, substantive: **kole.l**, 'smithy'.

If the ligatured leaf connotes a **kamat.ha** (rebus: kampat.t.am 'mint' (Ta.)); **kampat.amu** 'furnace' (Te.)

Depiction of a pannier on a one-horned bull

What is being depicted orthographically is the waist-zone of the one-horned bull:

Glyph: **kamarasa_la** = waist-zone, belt (Te.) kammaru = the loins, the waist (Ka.Te.M.); kamara (H.); kammarubanda = a leather waist band, belt (Ka.H.) kammaru = a waistband, belt (Te.) kammarincu = to cover (Te.) kamari = a woman's girdle (Te.) komor = the loins; komor kat.hi = an ornament made of shells, resembling the tail of a tortoise, tied round the waist and sticking out behind worn by men sometimes when dancing (Santali) kambra = a blanket (Santali) Rebus: kamar 'smith'; sa_la 'workshop'.

Like the postman in *Father Brown*, the linguistic area of Bharat, circa 5500 years Before Present, has gone unnoticed simply because it is all around us, as a dialectical continuum stretching from Kanyakumari to Kashmir, from Dholavira to Dacca. The prehistory of the civilization is also all around us emphasizing the cultural continuity for over 5500 years to the present day.

Our pitr. postmen have delivered the messages in emphatic glyphs constituting over 3,000 epigraphs anchored on lexemes of the linguistic area of the civilization.

The substratum language was **mleccha**! We had somehow not noticed the postmen for the last 150 years, ever since the first seal was discovered close to the banks of River Sarasvati.

It is possible to identify both the **mleccha** messenger and the **mleccha** messages.

To quote, **Tolka_ppiyam**, "**ella_c collum porul. kur-ittan-ave_**" (**Tol. Col. Peya. 1**), i.e. all words are semantic indicators. Hence, the use of rebus to denote *res* 'things'.

Seal impression, Ur (Upenn; U.16747)); [After Edith Porada, 1971, Remarks on seals found in the Gulf States. *Artibus Asiae* 33 (4): 331-7: pl.9, fig.5]; Parpola, 1994, p. 183; water carrier with a skin (or pot?) hung on each end of the yoke across his shoulders and another one below the crook of his left arm; the vessel on the right

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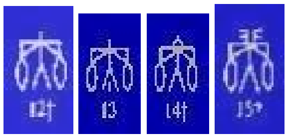
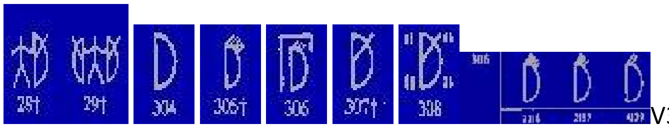
end of his yoke is over a receptacle for the water; a star on either side of the head (denoting supernatural?). The two celestial objects depicted on either side of the water-carrier's head can be interpreted as a phonetic determinant: ko_l. 'planet'. The whole object is enclosed by 'parenthesis' marks. The parenthesis is perhaps a way of splitting of the ellipse (Hunter, G.R., *JRAS*, 1932, 476). kut.i = a woman water-carrier (Te.) kut.i = to drink; drinking, beverage (Ta.); drinking, water drunk after meals (Ma.); kud.t- to drink (To.); kud.i to drink; drinking (Ka.); kud.i to drink (Kod.); kud.i right, right hand (Te.); kut.i_ intoxicating liquor (Skt.)(DEDR 1654).Rebus: kut.hi 'a furnace for smelting iron ore to smelt iron'; *kolheko kut.hieda* koles smelt iron (Santali) kaca kupi 'scorpion' (Santali) Rebus kacc = iron (Go.)

Hunter calls it an unmistakable example of an 'hieroglyphic' seal. enclosure Signs of the field: ( )

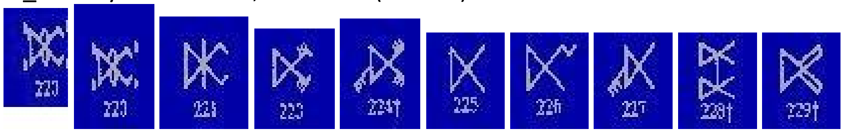

Sign 12 (80) is a ligature of kan.d.a kanka 'rim of pot' + kut.i 'water carrier'. Rebus: kan.d.a kanka 'altar for copper' + kut.hi 'metal furnace'. *ke~r.e~ ko~r.e~* an aboriginal tribe who work in brass and bell-metal (Santali)

Sign 15 is a ligature of Sign 12 and Sign 342 Thus, Sign 15 can be orthographically read as: kola, kol.i = water-carrier; khan.d.a kanka = rim of a jar. The rebus representation, i.e. homonyms could be: kanaka = gold; kolhe = smelters of iron.]


V305
V307 ka_mat.hum [Skt. kamat.ha a bamboo] a bow (G.lex.) ka_m.t.hi, Glyph: *kamat.ha* bamboo (Skt.)

*ka_ma_t.i_* [*komat.i_* (M.)] a caste of hindus who are generally palanquin bearers and labourers (G.); *ka_m* work (G.) Substantive: *ka_mat.ha_yo* a learned carpenter or mason, working on scientific principles (G.) Rebus: kamat.amu, kammat.amu = portable furnace for melting precious metals (Te.) kampat.t.am = mint (Ta.) kammat.i_d.u = a goldsmith, a silversmith (Te.) kampat.t.tam coinage coin (Ta.); *kammat.t.am kammit.t.am* coinage, mint (Ma.); *kammat.a* id.; *kammat.i* a coiner (Ka.)(DEDR 1236)
Ligature on Sign 28: dhanus 'bow' (Skt.) dhan.i_ = the owner, the possessor (G.)

Glyph: kama_t.hiyo = archer; ka_mat.hum = a bow; ka_mad.i_, ka_mad.um = a chip of bamboo (G.) ka_mat.hiyo a bowman; an archer (Skt.lex.)



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kamat.ha = a crab, a tortoise (G.lex.) kamat.ha = tortoise (Skt.) kamad.ha, kamat.ha, kamad.haka, kamad.haga, kamad.haya tortoise (Pkt.lex.) kamat.hamu = a tortoise; kamat.hi = a female tortoise (Te.lex.)

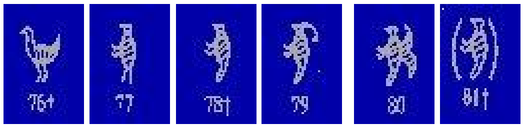
mer.go = with horns twisted back; mer.ha, *m.,* mir.hi *f.=* twisted, crumpled, as a horn (Santali.lex.)

mer.hao = to entwine itself, wind round, wrap around, roll up (Santali.lex.)

mer.ed, me~r.ed iron; enga mer.ed soft iron; sand.i mer.ed hard iron; ispa_t mer.ed steel; dul mer.ed cast iron; i mer.ed rusty iron, also the iron of which weights are cast; bicamer.ed iron extracted from stone ore; balimer.ed iron extracted from sand ore; mer.ed-bica = iron stone ore, in contrast to bali-bica, iron sand ore (Mu.lex.)

d.han:gar ‘trough’; rebus: d.han:gara, t.hakkura, 'blacksmith'.

Relief spinner Louvre Sb2834.jpg Elamite epigraph of Susa. kut.he = leg of bedstead or chair (Santali.lex.) Rebus: kut.hi ‘a furnace for smelting iron ore to smelt iron’; *kolheko kut.hieda* koles smelt iron (Santali) kol ‘tiger’ (Santali) [cf.tiger’s legs of the bedstead] bed.a hako ‘fish’ (Santali) Rebus: bed.a ‘either of the sides of a hearth’ (G.) bhin.d.a a lump, applied especially to the mass of iron taken from the smelting furnace (Santali)
[Early form of hako is ‘ayo’; rebus: ayas ‘metal’] Six: bat.a (G.); Rebus: bat.a ‘furnace’.



bat.a ‘quail’; rebus: bat.a ‘furnace’. Ligatured glyph of bird and fish enclosed within () may thus be a homograph of : bat.a ‘six’ = bat.a ‘quail’. The fish may be read rebus: bed.a ‘hearth’; rebus: bed.a hako ‘fish’. hako ‘fish’; rebus: hako ‘axe’. Could this be a representation of a special hearth used for casting ‘axes’?

m1181A 2222 Pict-80: Three-faced, horned person (with a three-leaved pipal branch on the crown), wearing bangles and armlets and seated, in a yogic posture, on a hoofed platform

ad.aru twig; ad.iri small and thin branch of a tree*; ad.ari* small branches (Ka.); *ad.aru* twig (Tu.)(DEDR 67). Cf. at.artti = thickly grown as with bushes and branches (Ta.) *d.ar a* branch; *dare* a tree; a plant; to grow well; ban: *darelena* it did not grow well; *toa dare* mother, the support of life (Santali) Rebus: aduru ‘native metal’ (Ka.)

Mane ul.a (IL 1240)
ur..a = king’s paraphernalia (Ma.)

The face is depicted with bristles of hair, representing a tiger’s mane.

cu_d.a_, cu_la_, cu_liya_ tiger’s mane (Pkt.)(CDIAL 4883)

d.hon.d.-phod.o [M. dhon.d.a_, a stone] a stone-cutter, a stone-mason; *d.hon:d.-jhod..o* [M. *dhon.d.a_* a stone + *jhod.avum*] a stone-cutter; a stone-mason; *d.hon.d.o* a stone; a blockhead; a stupid person (G.)

dho~n.d. a species of snake found in water; *bitkil dho~n.d., raj dho~n.d., ayan: dho~n.d.* (Santali) *d.ond.ya_* water-snake (Kol.); *d.ond.uli, dho_ndi_* (Go.); < *dun.d.ubha* (Skt.)(DEDR 2985; CDIAL 6411).

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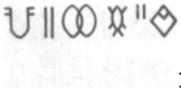
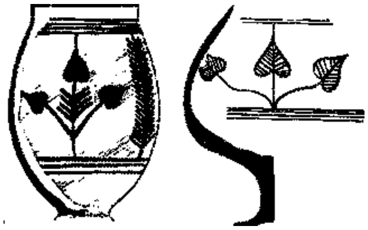
That silver metal --khura--is conveyed by the glyph (hoof on the legs of the stool) is reinforced on other epigraphs where a person is shown seated on a stool. m0453At

m453BC  1629 Pict-82 Person seated on a pedestal flanked on either side by a kneeling adorant and a hooded serpent rearing up.

h95-2485 sides 1 and 2. Harvard Harappa Project. The bunch of twigs = ku_di_, ku_t.i_ (Skt.lex.) ku_di_ (also written as ku_t.i_ in manuscripts) occurs in the Atharvaveda (AV 5.19.12) and Kaus'ika Su_tra (Bloomsfield's ed.n, xliv. cf. Bloomsfield, American Journal of Philology, 11, 355; 12,416; Roth, Festgruss an Bohtlingk, 98) denotes it as a twig. This is identified as that of Badari_, the jujube tied to the body of the dead to efface their traces. (See *Vedic Index*, I, p. 177). Rebus: kut.hi 'a furnace for smelting iron ore to smelt iron'; *kolheko kut.hieda* koles smelt iron (Santali) kaca kupi 'scorpion' (Santali) Rebus kacc = iron (Go.)

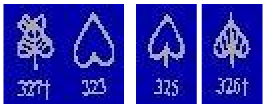


Substantive: aduru 'native metal'.

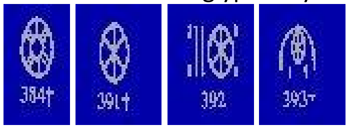
ad.rna_ to twist back one's limbs or bend the body inward (as under threat of a blow)(Kur.); ad.re to strut; ad.ro a swaggerer (Malt.)(DEDR 108). [cf. the glyphs of antelope and tiger with their heads turned backwards.]

ad.aru twig; ad.iri small and thin branch of a tree; ad.ari small branches (Ka.); ad.aru twig (Tu.)(DEDR 67).

Goblet, black on red slip, Nausharo ID, Kachi Plain, Baluchistan (After Samzun, A., 1992, Observations on the characteristics of the pre-Harappan remains, pottery, and artifacts at Naudsharo, Pakistan (2700-2500 BCE) in: C. Jarrige, ed., South Asian Archaeology 1989, 245-252, Madison, Wisc.: 250, fig. 29.4, no.2, Mission Archeologique de Indus. Goblet. Mundigak IV, 1, eastern Afthanistan (After Casal, J.M., 1961, Fouilles de Mundigak, I-II, Memoires de la delegation archeologique francaise en Afghanistan 17, Paris. II: fig. 64, no.171, Delegation Archeologique Francaise en Afghanistan.



kamar.kom 'ficus' glyph may be remus for 'mint': kampat.t.am



era, erako 'nave of wheel'; erako_lu the iron axle of a carriage (Ka.) eraka, er-aka any metal infusion (Ka.Tu.)

Portable stove of a goldsmith, ban:gala

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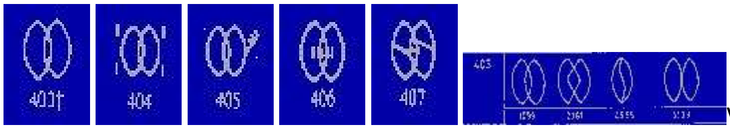
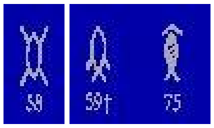
ban:gala = kumpat.i = an:ga_ra s'akat.i_ = a chafing dish a portable stove
a goldsmith's portable furnace (Te.lex.) cf. ban:garu ban:garamu = gold (Te.lex.)



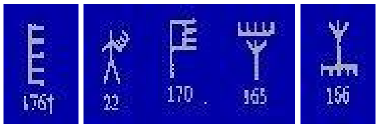
V403 ban:gad.i_ a bangle, a bracelet of glass, gold, or other material, worn on the wrist by women (G.lex.) bhagan.a = a bangle (IA 19)(IEG) ban:gan = bangle (cf. Ka_li_ban:gan, black bangle: name of a site on River Sarasvati banks)

bahula_ = Pleiades (Skt.) bagal.a_ = name of a certain godess (Te.lex.) bagal.a_, bagal.e, vagala_ (Ka.); bakala_, bagal.a_, vagal.a_ (Te.); bagal.a_devi = one of the s'akti deities by means of which one may shut the mouth of an opponent, etc. (Ka.lex.) bakkula = a demon, uttering horrible cries, a form assumed by the Yakkha Ajakala_paka, tto terrify the Buddha (Pali.lex.) bahula_ pl. the Pleiades (VarBr.S.); bahulika_ pl. (Skt.); bahul (Kal.); ba_l, baul, balh (Kho.); bol, boul, bolh (Kho.); bale (Sh.)(CDIAL 9195). bahulegal. = the Pleiades or Kr.ittika_-s (Ka.lex.) bahula_ (VarBr.S.); bahul (Kal.) six presiding female deities: vahula_ the six presiding female deities of the Pleiades (Skt.); va_kulai id. (Ta.)(Ta.lex.) 5719.Image: pleiades: bahulika_ pl. pleiades; bahula born under the pleiades; the pleiades (Skt.lex.) bahule, bahulegal. the pleiades or kr.ttika_s (Ka.)(Ka.lex.) Image: female deities of the pleiades: va_kulai < vahula_ the six presiding female deities of the Pleiades; va_kule_yan- < va_kule_ya Skanda (Ta.lex.) pa_kulam < ba_hula the month of Ka_rttikai = November-December; pa_kul.i full moon in the month of purat.t.a_ci (Vina_yakapu. 37,81)(Ta.lex.) ba_hule_ya Ka_rttike_ya, son of S'iva; ba_hula the month ka_rttika (Skt.Ka.)(Ka.lex.)



bed.a hako 'fish' (Santali) Rebus: bed.a 'either of the sides of a hearth' (G.) [Early form of hako is 'ayo'; rebus: ayas 'metal']

kolli = a fish (Ma.); koleji id. (Tu.)(DEDR 2139). ko_la_ flying fish, exocaetus, garfish, belone (Ta.) ko_la_n, ko_li needle-fish (Ma.)(DEDR 2241).



kangha (IL 1333) kan:g = brazier, fireplace (K.)(IL 1332) kan:kata = comb (Te.) Rebus: kan:gar = portable furnace (K.)

2.5.6.3 Fire-pit, furnace, kulme

The glyph, 'three short numeral strokes' occurs twice and with a 'rice-plant' glyph. kolom 'three' (Austro-asiatic) kolmo 'rice-plant' (Santali) Rebus: kolmi 'smithy'(Go.) kolame a very deep pit, abyss, hell (Tu.)(DEDR 2157). kulume kanda_ya a tax on blacksmiths (Ka.); kol, kolla a furnace (Ta.) *kole.l* smithy, temple in Kota village (Ko.); *kwala.l* Kota smithy (To.); *konimi* blacksmith; *kola* id. (Ka.); *kolle* blacksmith (Kod.); *kollusa_na_* to mend implements; *kolsta_na, kulsa_na_* to forge; *ko_lsta_na_* to repair (of plough-shares); *kolmi* smithy (Go.); *kolhali* to forge (Go.)(DEDR 2133).] kolimi-titti = bellows used for a furnace (Te.lex.) kollu- to neutralize metallic properties by oxidation (Ta.lex.) kol brass or iron bar nailed across a door or gate; kollu-t-tat.i-y-a_n.i large nail for studding doors or gates to add to their strength (Ta.lex.) kollan--kamma_lai < + karmas'a_la_, kollan--pat.t.arai, kollan-ulai-k-ku_t.am blacksmith's workshop, smithy (Ta.lex.) cf. ulai smith's forge or furnace (Na_lat.i, 298); ulai-k-kal.am smith's forge; ulai-k-kur-at.u smith's tongs; ulai-t-turutti smith's bellows; ulai-y-a_n.i-k-ko_l smith's poker, beak-iron (Ta.lex.)

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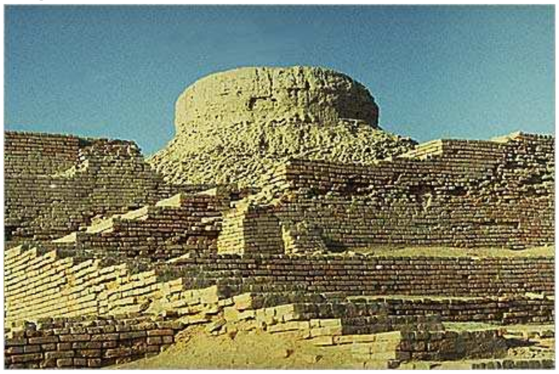
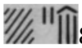
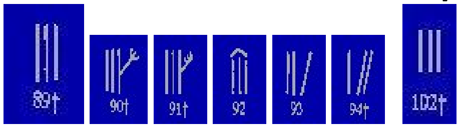
[kollulaive_r-kan.alla_r: nait.ata. na_t.t.up.); mitiyulaikkollan- mur-iot.ir.r.an-n-a: perumpa_)(Ta.lex.) Temple; smithy: kol-l-ulai blacksmith's forge (kollulaik ku_t.attin-a_l : Kumara. Pira. Ni_tiner-i. 14)(Ta.lex.) cf. kolhua_r sugarcane milk and boiling house (Bi.); kolha_r oil factory (P.)(CDIAL 3537). *kulhu* 'a hindu caste, mostly oilmen' (Santali) kolsa_r = sugarcane mill and boiling house (Bi.)(CDIAL 3538).

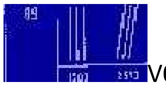
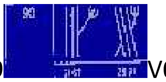
A 

stupa is a temple. So is the stupa mound found at Mohenjodaro. It is possible that this stupa was in place during the mature phase of the civilization, comparable to the Ur ziggurat.

That the glyph 'three numeral strokes' has to be read rebus has been explained in context of ligatures and contextual occurrence as in the following examples:

Kalibangan029 8018 [ad.aren 'lid'; rebus: aduru 'native metal'; the ligatured glyph may thus connote a furnace for native metal.]



V089V090 V091

Signs and sign variants 89 to 94 also indicate tha t the 'plant' glyph is ligatured to the three-linear-strokes glyph. This is an affirmation of 'plant' as a phonetic determinant of the three-linear-strokes glyph.

Kalibangan065a Kalibangan065A6 Kalibangan065E 8024 Pict-104: Composition: A tree; a person with a composite body of a human (female?) in the upper half and body of a tiger in the lower half, having horns, and a trident-like head-dress, facing a group of three persons consisting of a woman (?) in the middle flanked by two men on either side throwing a spear at each other (fencing?) over her head.

kola_ burning charcoal (L.P.); ko_ila_ burning charcoal (L.P.N.); id. (Or.H.Mth.), kolla burning charcoal (Pkt.); koilo dead coal (S.); kwelo charcoal (Ku.); kayala_ charcoal (B.); koela_ id. (Bi.); koilo (Marw.);

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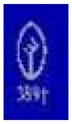
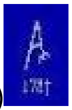
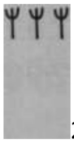
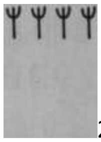
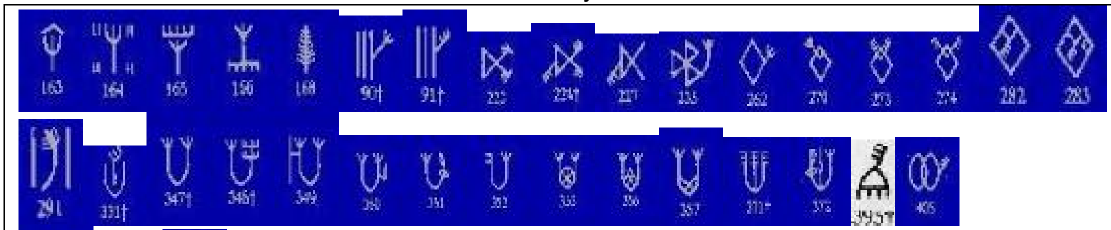
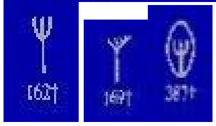
koyalo (G.)(CDIAL 3484). < Proto-Munda. ko(y)ila = kuila black (Santali): all NIA forms may rest on ko_illa.] koela, kuila charcoal; khaura to become charcoal; ker.e to prepare charcoal (Santali.lex.)

 (29) Sign 178 (35) 'Tree' Field symbol 44 (6)

Grapheme: ko_lemu = the backbone (Te.)

2949 Dotted circles 2950 Rojdi

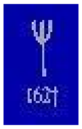


 PLUS a number of variants and with ligatures: Signs162, 167, 169, 387,389 +variants; Ligatures: Signs163, 166-6, 168, 90, 91,223,224,227,235.262,270,273,274, 282,283,291,331, 347-352, 355-357,371,372, 388-390,395,405

kolom = cutting, graft; to graft, engraft, prune; kolom dare kana = it is a grafted tree; kolom ul = grafted mango; kolom gocena = the cutting has died; kolom kat.hi hor.o = a certain variety of the paddy plant (Santali); kolom (B.); kolom mit = to engraft; kolom porena = the cutting has struck root; kolom kat.hi = a reed pen (Santali.lex.) cf. kolom = a reed, a reed-pen (B.); qalam (Assamese.Hindi); kolma hor.o = a variety of the paddy plant (Desi)(Santali.lex.Bodding) kolom baba = the threshed or unthreshed paddy on the threshing floor; kolom-ba_rum = the weight a man carries in taking the paddy from the threshing floor to his house; kolom = a threshing floor (Mundari); cf. kal.am (Tamil) [Note the twig adoring the head-dress of a horned, standing person]

ku_l.e stump (Ka.) [ku_li = paddy (Pe.)] xo_l = rice-sheaf (Kur.) ko_li = stubble of jo_l.a (Ka.); ko_r.a = sprout (Kui.) ko_le = a stub or stump of corn (Te.)(DEDR 2242). kol.ake, kol.ke, the third crop of rice (Ka.); kolake, kol.ake (Tu.)(DEDR 2154) [kural = corn-ear (Ta.)]

Five-petalled plant or five-branched shrub

m1123  kolma hor.o ' a variety of rice plant' (Santali.lex.) kolame 'furnace, smithy, forge' (Ka.)

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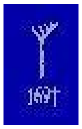
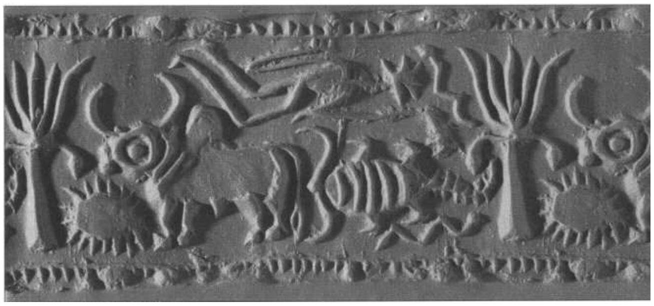
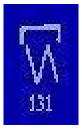
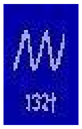
 Are these Signs 162 and 169 distinct are simply homographs, connoting the same word?



Given the orthographic representation of five-petals on Sign 169, this glyptic representation of a 'sprout' can be related to another unique 5-petalled plant, 'tabernae montana' shown on Ur cylinder seal with *taberna montana* plant, BM 122947; Signs 162 and 169 Based on this identification, we can conclude that Sign 162 denoted kolma 'rice-plant'; while Sign 169 denoted tagara, 'tin'.

  tagara wave (Si.)(CIDAL 5699).

tagar = to be stopped or impeded; to impede (Ka.lex.) [cf. the motif of a person holding back tigers or bulls on either side].

tagr.a = large, massive, strong; tagoj = strength (Santali.lex.)

tagar. = a trough; tagar.re surti ar cunko sipia they mix surti and lime in a trough (Santali.lex.) taga_rum [Pers. tagarih] a bricklayer's trough; a hod (G.lex.)

ero = watering place for cattle (G.) Rebus: era, eraka 'copper' (Ka.)

Tub: go_lemu (Te..) gollemu, gol.l.emu (Te.) Rebus: kolame 'furnace' (Ka.)

tagara = ram (Te.lex.); takaram (Ta.lex.); t.agaru, t.agara, t.igaru, tagar = a ram (Ka.); tagara, tan:gad.i_ (H.M.); tagade_ra, tagate_ra = having a ram for his vehicle: fire (Ka.)(Ka.lex.) Old Tamil: takar 1. sheep; 2. ram; 3. goat; 4. aries in the zodiac; 5. male ya_r..i 6. male elephant; 7. male shark. t.agarudaleya, t.agarutaleya = daks.abrahmanu, Daks.a, the son of Brahma_, father of Durga_ and father-in-law of S'iva, who on one occasion celebrated a great sacrifice to obtain a son, but omitted to invite S'iva, wherefore S'iva interrupted the sacrifice, and by his incarnation Vi_rabhadra had Daks.a decapitated; for the decapitated head that of a ram was substituted (Ka.lex.) 4080.<u>Images: ram; male elephant; male shark</u>: takar sheep, ram, goat, male of certain other animals (porutakar ta_kkar-ku-p- pe_run takaittu : Kural.486); male elephant; male shark (Ta.lex.) (ya_l.i, elephant, shark)(Ta.); takaran huge, powerful as a man, bear, etc. (Ma.); tagar, t.agaru, t.agara, t.egaru ram (Ka.) tagaru, t.agaru id. (Tu.); tagaramu, tagaru id. (Te.); tagar id. (M.)(DEDR 3000). tan:gad.i_, tagara a ram (M.H.); tagade_ra having a ram for his vehicle: fire; tagarven.agisu to cause rams to fight (Ka.lex.) da_dlo bokro ram (Kon.lex.) [cf. kara_ male alligator; kar.e_n.u elephant (Ta.lex.)]

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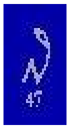
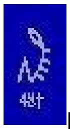
Alloy: tara_ alloy of 8 parts of copper to 5 of tin, used for making metal vessels (pukar..tara_-p-po_kkillai) (Cine_n-. 169)(Ta.lex.)

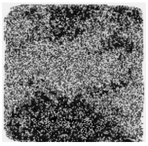
Rebus glyph: ta_ra_ = stars (Skt.)

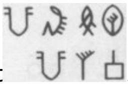


panjhar ‘ribs’; rebus: pasra ‘smithy’; vikalpa: ko_lemmu = the backbone (Te.lex.) Rebus: kolame ‘furnace’ (Ka.)

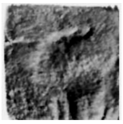
Pictorial motifs of spearing or killing

koru, kori, korru to kill (Kor.) kol ‘to kill’ (Ta.) kola = killing, e.g. a_d.ukola = woman-slaying (Te.) kol =metal (Ta.) go.l- (god.d.-) to beat, shoot with bow; god. to cut with axe (Kol.); gor.- (got.-) to strike, beat, kill (Nk.); kol. (kol.v-, kon.t.-) to strike, hurt; ko_l. killing, murder (Ta.); kol.ka (kon.t.-) to hit, take effect, come in contact (Ma.); kol.l.ikka to hit; ko_l. hitting, wound, damage (Ma.); kol.-/kon.- (kod.-) to pain, trouble (Ko.); kwil. (kwid.-) to quarrel (To.); kon.pini to hit; kol.puni, kolpuni to come into collision (Tu.); konu to be pierced as by an arrow (Te.)(DEDR 2152).

krammara ‘looking back’ (Te.); rebus: kamar, karma_ra ‘blacksmith’ (Santali.Skt.)


m1452Act

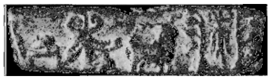
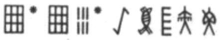
m1452Bct

2912 (Similar imagery of an antelope looking back appears on m-1448 to m-1452).


m0438atcopper

m0272 Goat-antelope with horns bending backwards and neck

m0488Atm0488Btm0488Ct

2802 Prism: Tablet in bas-relief. Side b: Text +One-horned bull + standard. Side a: From R.: a composite animal; a person seated on a tree with a tiger below looking up at the person; a svastika within a square border; an elephant (Composite animal has the body of a ram, horns of a zebu, trunk of an elephant, hindlegs of a tiger and an upraised serpent-like tail). Side c: From R.: a horned person standing between two branches of a pipal tree; a ram; a horned person kneeling in adoration; a low pedestal with some offerings.

On side B of a tablet (h177), kneeling person is shown in prayer in front of a standing person under an arch decorated with a toran.a of ficus leaves.

man.d.a = a branch; a twig (Te.lex.)

Feline figurine terracotta. A woman’s face and headdress are shown. The base has a hole to display it on a stick. (After JM Kenoyer/Courtesy Dept. of Archaeology and Museums, Govt. of Pakistan).

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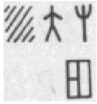
It appears that the person holding back the two rearing jackals on the tablet is a woman: ko_l 'woman' (Nahali); dual. ko_lhilt.el (Sudhibhushan Bhattacharya, Field-notes on Nahali, *Ind. Ling.* 17, 1957, p. 247); kola = bride, son's (younger brother's) wife (Kui) ko_l is a phonetic determinative of the two jackals, kol 'tiger'; rebus: kol 'metal' (Ta.)

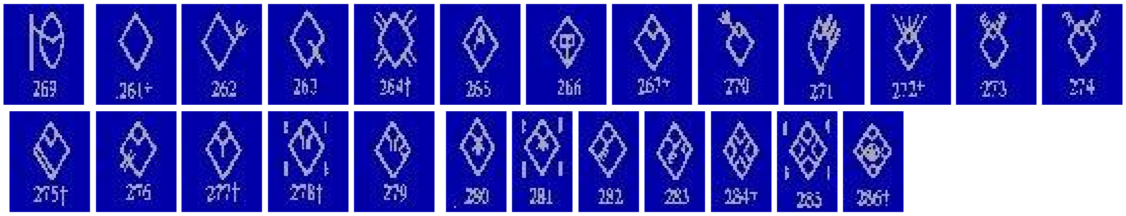
The decoding of 'woman' glyph on the tablet as a phonetic determinative of kol 'tiger' gains surprising validation from a ligatured terracotta image of a feline tiger with a woman's face and headdress..

Mesopotamia. Cylinder seal, ca. 2254-2220 BCE (mature); ceramic; cat. 79; two groups in combat. A naked, bearded hero wrestles with a water buffalo, and a bull-man wrestles with a lion. In the centre: inscription (unread). Appears to be recut. Pictorial motif: Person grappling with two tigers standing on either side of him and rearing on their hindlegs.

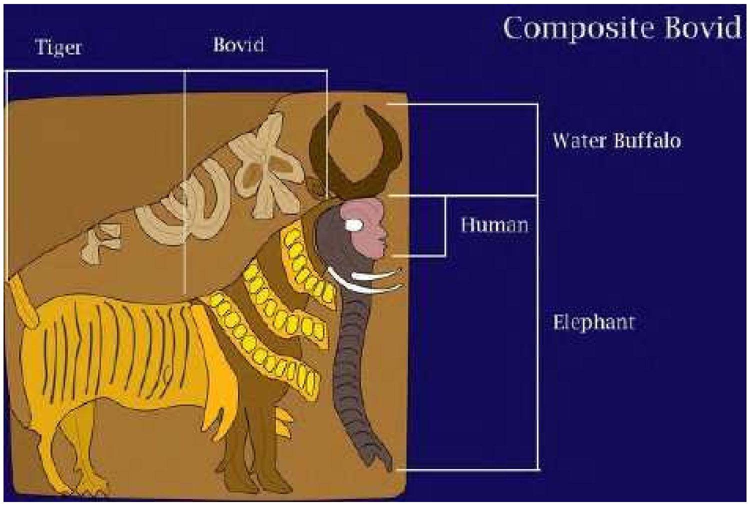
Person throwing a spear at a buffalo and placing one foot on the head of the buffalo.  2279 seal impression, Mohenjodaro (DK 8165); after Mackay 1938: pl.88, no.279

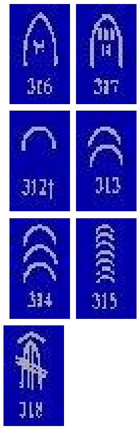
ad.arincu, ad.arucu *caus.* of ad.a.ru = to shoot as a missile (Te.)

aduru = native metal (Ka.)



kana kona = corner (Santali) kan- copper work, copper (Ta.) Rebus: kancu 'bronze' (Te.)





gummat.a cupola, dome (Ka.) kumpat.i = chafing dish (Te.) gad.d.a proyyi = a fireplace or

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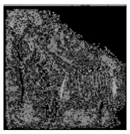
hearth with 3 or 4 inverted hemispherical clods placed on it (Te.)

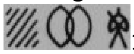
Elements in m304 face (after Huntington): two profile faces, bovine ears. Probable bristles like the bristles on a tiger's mane. The face profiles do not match with other faces profiled on other inscribed objects. The profiles of two faces however, can be compared the profile of human face shown on this seal of a composite animal (elements: human, tiger, tiger's mane, markhor horns).

m304 torso is enveloped in a garment, with ties around the waist of the figure. There is nothing ithyphallic in this orthography of a human adorned with bangles on the arms upto the shoulders and wearing jewellery shown on the chest.

The key question is: how does the central figure relate to the animals and a standing human (betwixt an elephant and a leaping tiger) surrounding the figure.



m0299 Composite animal with the body of a ram, horns of a bull, trunk of an elephant, hindlegs of a tiger and an upraised serpent-like tail.

1381 Composition of bovid on m299. Many component elements of this composition also are included in the composite animal: human (face), tiger, elephant, water-buffalo, bovine legs, tail with three strokes and neck-rings (comparable to the rings on the neck of the heifer?).

Glyphs surrounding the seated yogin.

This composition of a person seated in penance (kamad.ha) is entirely made up of glyptic elements read rebus as hieroglyphs related to the repertoire of a smithy and the professional competence/possessions of a metalsmith. Glyptic elements are either pictorial motifs (including for example: animals, pedestal, corn-sheaf, buffalo horns) or normalised glyphs called 'signs' -- such as 'rim of narrow-necked jar' or 'claws of a crab' or a 'standing person's body'.

Examples of rebus readings of hieroglyphs (glyptic elements):

kamad.ha 'penance'(Pkt.); rebus: kampat.t.am 'mint'(Ta.) [camman.am 'sitting cross-legged'(Ta.Ma.); saman.a 'ascetic'(Pkt.Pali)]
tha_ttha_r 'buffalo horns'; t.hat.hera 'brass worker'.
cu_d.a 'tiger's mane'; rebus: cu_l.a 'furnace'.
kolmo 'three (faces)'; rebus: kolimi 'forge'.
mukha 'face'; rebus: mu~h 'ingot'.
kamarsa_la 'waistband'; kamar 'blacksmith'; sala 'workshop'.
kod.u 'bracelet'; rebus: kod. 'workshop'.
(L) {N} ``raised platform for puja''. #34282; rebus: mand.a_ 'warehouse'.
me_t.u = a heap, stack; rick, as of hay (Te.) ; rebus: med. 'iron'.
krammara 'look back' (as antelope); rebus: kamar, karma_ra 'blacksmith'.
mr..eka 'antelope'; rebus: milakkhu 'copper' (Pali)
kol 'tiger'; rebus: kol 'alloy of five metals, furnace'.
kat.avai 'leap, jump'; rebus: kad.avu 'turning lathe'; vikalpa: d.a_t. to hop, jump (Kond.a); rebus: datu 'mineral'.
ibha 'elephant'; rebus: ib 'iron'.
bara_ boar (A.B.);rebus: bhar 'oven'.

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kat.iya_ buffalo heifer (G.); rebus: ka_t.i, furnace (trench)(Ta.)
khag 'rhinoceros'; rebus: kang 'portable furnace'.

Body of human rebus: man.d.ua ‘booth, shed’ Glyph: *mandar* ‘the headman of a village’; *man.d.wari* ‘the Marwari caste of hindus’ ***Ko.*** **mand** Toda mund (i.e. village); burning place for dry funeral; **mandm (*obl.* mandt-)** meeting. ***To.*** **mot** locus of tribal activity, including village with dairy, dairy apart from village, and funeral place; patrilineal clan. ***Ka.*** **mandu** hamlet of the Todas on the Nilagiri. ***Ko.*** **mandï** village green; ***Ta.*** **mantu** hall of assembly, golden hall of Chidambaram, court of justice, arbitration court, cow-stall, herd of cows, raised platform under a tree for village meetings, centre of a garden, junction of four roads or streets (DEDR 4777). Vikalpa glyph: (see the tail on composite animal orthographed like a snake.) **mod.avum** = to twist, to turn, to bend (G.lex.) **mon.d.** = the tail of a serpent; jambr.o mon.d. = the tail of the rock snake (Santali.lex.)

Two ricks (haystacks), stool/platform **pan~ja** = heap, pile (Pali.lex.) **pagar** = a heap of corn; pagor = a heap of ears of corn, made to separate the grain from the husk (G.lex.) pasra ‘smith’s forge’.

Water-buffalo ra~_go buffalo bull (Ku.N.)(CDIAL 10559). ra_ngo = buffalo (Santali); kuranga = antelope (Sanskrit); ran:ku = antelope (Santali) ran:ku = tin (Santali)

Rhinoceros badhia = castrated boar (Santali) Gu<badia> {N} ``^boar''. *Des.<baria>(M) `pig(G), boar(M)'. bar.ea ‘merchant’; badhi ‘work in wood and iron’

Faces mukha ‘face’; rebus: mu~h ‘ingot’
Tiger’s mane cu_l.a ‘tiger’s mane’; cu_l.ai ‘kiln’.
Bangles on hands **cur.i** a bracelet, a bangle (Santali) rebus: **cu_l.ai**, ‘kiln’ (Ta.) **culli** = a fireplace (Ka.)
Waistband kamarsa_la ‘waistband’; rebus: kamar ‘smith’; sala ‘workshop’
Buffalo horns tatta_ru (buffalo horn); rebus: hahero ‘brass worker’
Twig The twig ligatured to the buffalo horn: **man.d.a** = a branch; a twig (Te.lex.) rebus: **man.d.a_** = warehouse, workshop (Kon.lex.)

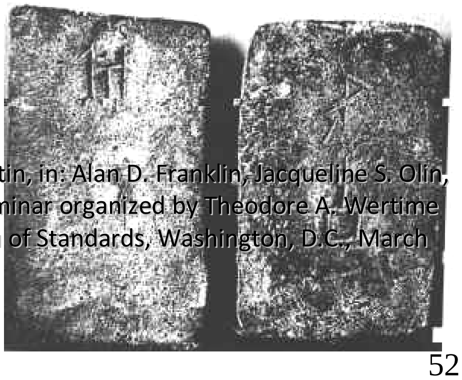
2.5.7 Conclusions related to the writing system (Sarasvati hieroglyphs)

The writing system, mlecchita vikalpa, is a creation of the early mine-workers and metallurgists of Sarasvati civilization. The language is mleccha, the language in which Yudhishthira converses with Vidura and Khanaka (miner!) in the Mahabharata (about the jaatugriha, the shellac house with non-metallic killer devices). Mlecchita vikalpa is one of the 64 arts to be learnt by youth. This, together with des’a bhaashaa jnaana and akshara mushthika kathanam (language and communication systems using mudra-s, that is, fingers and wrists) constitute three language-and-writing system-related arts. Mleccha are milakkhu ‘copper workers’, the Meluhha who is depicted on a cylinder seal (carrying an antelope, mr..eka, rebus, milakkhu ‘copper’ -- transacting with Metopotamian civilization.

2.5.7.1 Rosetta stones for decoding the Indus script (Sarasvati hieroglyphs) -- Note on two pure tin ingots found in a ship-wreck, Haifa incised with Sarasvati hieroglyphs [46]

The hieroglyphs on the two ingots can be read, rebus:

ran:ku = tin (Santali)



[46] Source: New evidence for sources of and trade in bronze age tin, in: Alan D. Franklin, Jacqueline S. Olin, and Theodore A. Wertime, *The Search for Ancient Tin*, 1977, Seminar organized by Theodore A. Wertime and held at the Smithsonian Institution and the National Bureau of Standards, Washington, D.C., March 14-15, 1977].

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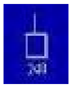
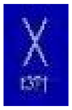


ran:ku = liquid measure (Santali)
ran:ku a species of deer; *ran:kuka* (Skt.)(CDIAL 10559). See middle glyph on copper plates m0522 & m0516



da_t.u = cross (Te.); dhatu = mineral (Skt.)

It is remarkable that the hieroglyphs 'antelope' and 'liquid measure' (which are clearly recognized as 'signs' of the epigraphs) also occur on two copper plate epigraphs. The glyphs are clearly related to the work of a smithy working with tin mineral.

2.6 Panca janaah: Peopling of India: Abstracts of and notes on genetic studies

The map of Marius Fontaine showing the sapta sindhu region is also the region where the panca janaah (five peoples) were nurtured. Many recent genetic studies help in validating the indigenous and autochthonous peopling of India in this region during the period of Sarasvati civilization.

2.6.1 Evolutionary history of Hindu civilization

Evolutionary history of Hindu civilization is closely linked to the evolutionary history of Vedic River Sarasvati and the River Ganga and the maritime, riverine movements of people along the Indian ocean rim.

This history is closely intertwined with the extraordinary earth science phenomena of: continental drift, plate tectonics, rise of the dynamic Himalayas, glacial and ice age cycles caused by the precession of the earth in its incessant rotation around the sun, creation of tsunamis, floods and river migration as a result of plate tectonic events, supereruption of Mt. Toba close to Hindusthanam, sacredness associated with a species unique to the Indian ocean area: *turbinella pyrum* (sacred s'ankha), intimations of maritime-riverine adventures recorded in the two historical narratives: Ramayana and Mahabharata which are the sheet-anchor of Hindu civilizational history, together with the Vedic texts, most of which were seen by mantra-drashtha rishi-s meditating on the banks of Vedic River Sarasvati.

2.6.2 Satyavrata, Vaivasvata Manu of Dravida des'a: exploding the myth of Aryan-Dravidian divide

In Hindu civilizational tradition, Satyavrata whose life-story is detailed in the Bhagavatam is recognized as Vaivasvata Manu, connected with the Great Flood and the Matsya avatara, the first of the ten avatara of Vishnu. The seventh manvantara is presided by Vaivasvata Manu. Svayambhuva, Svarochisha, Uttama, Tamasa, Raivata and Chakshusha were the previous six Manu-s.

An insight is provided by an IIT engineer from Kharagpur, Shri GV Subramanian who relates the supereruption of Mt. Toba about 74,000 years ago, to Vaivasvata Manu episode. [47]

That Satyavrata is from Dravidades'a is emphatic. Thus, the entire peopling of India since the start of the seventh manvantara (one of 14 which constitute a kalpa) can be related to the people of Dravidades'a as they moved towards the Gangasagar – and upstream navigating the River Ganga -- after the supereruption of Mt. Toba 74,000 years ago.

S'antiparvan of Mahabharata (CCCXLVIII) notes:

treta-yugadau ca tato vivasvan manave dadau

[47] http://hindutva97.blogspot.com/2008/05/manvantaras-pralaya-desiccation-r.html

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manus ca loka-bhrty-artham sutayeksvakave dadau
iksvakuna ca kathito vyapya lokam avasthitah
In the beginning of Treta yuga the supreme science of Bhagavad-Gita was delivered by the sun-god Vivasvan to Vaivasvata Manu the father of mankind who gave it to his son King Iksvaku the ruler of the planet Earth.

This is confirmed in Bhagavadgita Chap. IV, Verse 1:

sri bhagavan uvaca
iman vivasvate yogam proktavam aham avyayam
vivasvan manave praha manur iksvakave'bravit
Bhagavan Sri Krishna said: I instructed this supreme imperishable science unto the sun-god Vivasvan and he instructed it unto Vaivasvata Manu the father of mankind who instructed it to his son King Iksvaku, ruler of all the Earth (progenitor of Raghu dynasty).

The myth of Dravidian-aryan divide stands exploded, confirming the indigenous evolutionary history and essential unity among all people of Hindu civilization.

tatrarāja-rsiḥ kaścin nāmnā satyavrato mahān
nārāyana-paro 'tapattapaḥsasalilāśanaḥ Śrīmad Bhāgavatam 8.24.10
During the Cāksusa-manvantara there was a great king named Satyavrata who was a great devotee of the Supreme Personality of Godhead. Satyavrata performed austerities by subsisting only on water.

The Lord assumed one fish incarnation to save the Vedas at the beginning of the Svāyambhuva-manvantara, and at the end of the Cāksusa-manvantara the Lord again assumed the form of a fish just to favor the great king named Satyavrata. As there were two incarnations of Varāha, there were also two incarnations of fish. The Lord appeared as one fish incarnation to save the Vedas by killing Hayagrīva, and He assumed the other fish incarnation to show favor to King Satyavrata. [48]

yo 'sausatyavrato nāma rājarsir draviḍeśvaraḥ
jñānaḿ yo 'tīta-kalpānte lebhe puruṣa-sevayā
sa vai vivasvataḥ putro manur āsīd iti śrutam
tvattas tasya sutāḥproktā ikṣvāku-pramukhā ṇrpāḥŚrīmad Bhāgavatam9.1.2-3
Satyavrata, the saintly king of Draviḍadeśa who received spiritual knowledge at the end of the last millennium by the grace of the Supreme, later became Vaivasvata Manu, the son of Vivasvān, in the next manvantara [period of Manu]. I have received this knowledge from you. I also understand that such kings as Iksvāku were his sons, as you have already explained. [49]

There are nine sons to Vaivasvata Manu who match their father in every respect... their names are: ikShvAku, nAbhAga, dhR^iShNu, sharyAti, nariShyanta, prAMshu, while nAbhAga-ariShTa is the seventh, and karUSha is the eighth, and pR^iShadhra is ninth one... (Harivams'a, 1.10.1-2) According to Brahma Purana, Ila was the daughter.

2.6.3 Shell (sacred chank or s'ankha) industry, shell-workers in maritime phase of Hindu civilization

The evidence for the early phases of the Hindu civilization as a maritime, riverine civilization comes from the finds of s'ankha bangles and ornaments dated from circa 8500 years Before Present in the Sarasvati civilization area.

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[48] http://vedabase.net/sb/8/24/10/
[49] http://srimadbhagavatam.com/sb/9/1/2-3/

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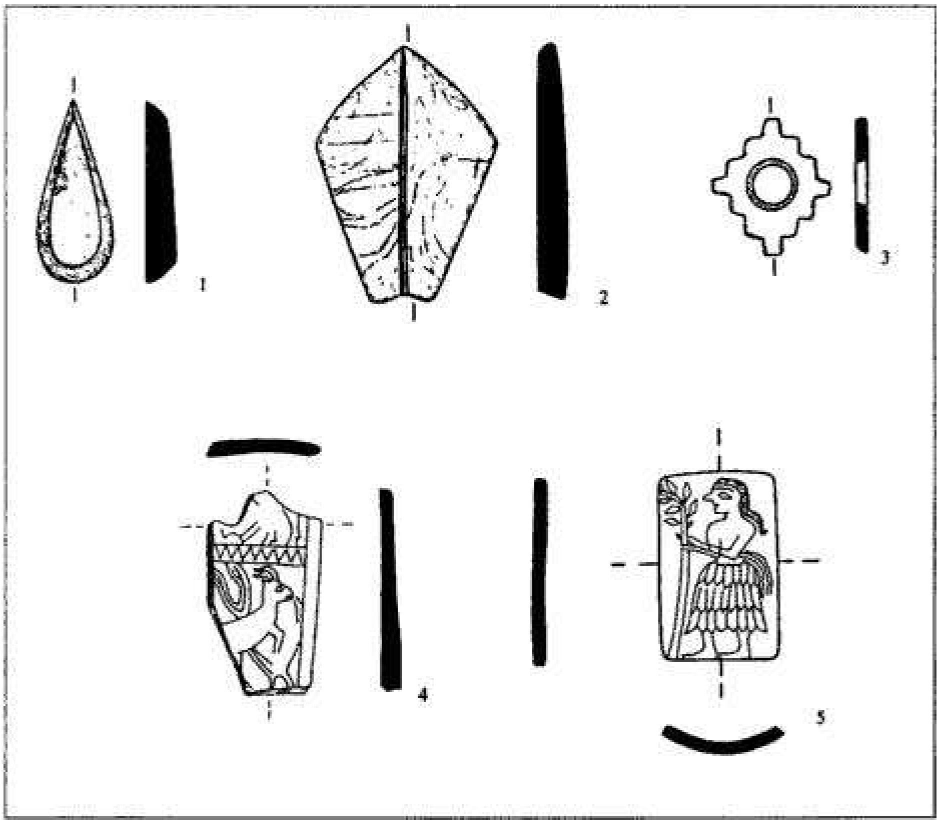

After Fig. XII.6 A selection of shell objects from Uruk. 1. tear-drop shaped inlay, Uruk period, 3.4 cm.long, 1.3 cm. max. width, 0.5-0.6 cm thickc (after Lindemeyer and Martin 1993: Taf. 114.1835); 2. petal inlay from a stone and shell rosette, Jamdat Nasr/ED 1,4.6 cm long, 3.9 cm max. width, 0.5 cm thick (after Lindemeyer and Martin 1993; Taf. 118.1857); 3. stepped cross inlay, Jamdat Nasr/ED I, 2.5 X 2.3 X 0.2 cm (after Lindemeyer and Martin 1993; Taf. 119.1883D); 4. incised inlay fragment, Jamdat Nasr/ED I, 3.8x2.2x0.4 cm (after van Eas and Pedde, 1992: Taf. 132.1612); 5. incised inlay, ED III, 3.4x2.1x0.3 cm (after van Eas and Pedde 1992: Taf. 131.1604). "Worked shell,particularly mother-of-pearl, was used for a variety of purposes, including the manufacture of inlays (Fig. XII.6), cylinder seals, lamps and rings. Of particular interest here are those objects which can be positively identified as having been made of marine shells, the habitat of which is restricted to the coast east and west of the mouth of the Indus Valley. In the past certain Mesopotamian objects, such as shell lamps from Tello and the Royal Cemetery at Ur, have been identified as being made of *Turbinella pyrum*, a gastropod which is common the coast of India and Pakistan as far west as Pasni in Pakistan Makran, and therefore identified as imports from the Harappan civilization. All of these objects, however, turn out to be made of *Lambis truncata sebae*, a species which occurs mainly on the coast of Oman (Gensheimer 1984;67,71). *Turbinella* was, however, used in the Early Dynastic III period for a number of massive cylinder seals, up to 4.9 cm in length and 3 cm in diameter, found in the Royal Cemetery." [50]

The use of s'ankha for a seal depicting Sarasvati hieroglyphs was reported from Dwaraka.

Seal, Bet Dwaraka 20 x 18 mm of conch shell

The maritime links date back to about 160,000 years Before Present as surmised by Oppenheimer as the migrations from Africa occurred along the coastline of the

[50] Potts, D.T.,1997, *Mesopotamian Civilization – the material foundations*, Cornell University Press, pp. 263-264.

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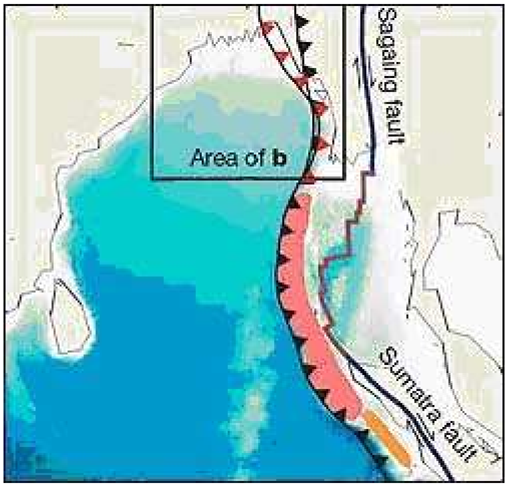
Indian Ocean (Hindu mahasagar). J.M. Kenoyer notes: "Even though the site of Mohenjo Daro is located far inland, a large number of shell artifacts were recovered during the early excavations from 1925 to 1938. These artifacts are spread out in numerous museums and reserve collections throughout India and Pakistan…All of the species used as raw materials are still found in the Arabian Sea and come from different areas of what used to be the coastal regions of the Indian Civilization, extending from Suktagen-dor on the Makran coast, to Lothal on the Gulf of Khambat (Cambay)…it is evident that Moenjo Daro definitely had workshops that specialized in the production of shell objects such as bangles, beads, inlay, utensils and other decorative objects…The raw shells, however, were most certainly transported to the site, and three major source areas can be defined on the basis of modern distributions of shell species; the Karachi coast, which supplied *Turbinella pyrum* and *Pugilina buchephala*; the Gulf of Kutch, which supplied the previous two species as well as Chicoreus ramosus, and possibly *Lambis truncata sebae* and *Fasciolaria trapezium*; and the coast of Oman, where all of the above species, except for *Turbinella pyrum* are found." [51]

2.6.3.1 Supereruption of Mt. Toba and Vaivasvata Manu

A hypothesis can be postulated that Vaivasvata Manu's movement can be related, in time, to the supereruption of Mt. Toba



The supereruption of Mt. Toba about 74,000 years ago may explain the peopling of India by migrations away from the southern coastlines into the Ganga and Sarasvati river basins. Such migrations may also explain the presence of austro-asiatic speakers in regions where minerals also occur since these early mineral explorers apparently traveled far and wide in search of alloying minerals to create hard metal tools and weapons.

Earth science studies have shown the impact of the continental drift on recurring plate tectonic events rendering both Himalayas and Hindusthanam as dynamic regions of the globe, dynamic even today as evidenced by the tsunami of December 26, 2004 caused by the ruptures in the Sunda plate east of India.

Sunda plate thrust (plate tectonics) which will cause the next tsunami on Indian Ocean (Nature Magazine, 6 Sept. 2007) [52]

Glacial age maps have been drawn based on extensive multi-disciplinary studies. One map shows how 18000 C14 years ago, during the ice age, it was possible for Hindusthanam and neighbouring south-asian regions could have been continuously populated since the regions were not impacted by the ice age which covered many parts north of Himalayas in Eurasia with upto 24 inches of ice sheets when not a blade of grass could have grown and when peoples' settments would have been virtually impossible. The finds of metamorphic rocks on the embankment of the now-dry-bed of Vedic River Sarasvati demonstrate that River Sarasvati had its origins in the Himalayan glaciers, Mt. Kailas, Manasarovar which continue to yield the waters of S'utudri and Vitasta (Sutlej and Beas) rivers which were tributaries of the

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[51] http://www.scribd.com/doc/3070884/Kenoyer1983-Shell-Industries-at-Moenjodaro (Kenoyer, J.M., Shell industries at Moenjo Daro, Pakistan in: IsMEO-Aachen-University Mission, Interim Reports Vol. 1, Reports of field-work carried out at Mohenjo Daro, Pakistan 1982-83).
[52] http://kalyan98.wordpress.com/2008/02/17/readying-the-nation-to-face-the-next-devastating-tsunami-response-to-dr-goel/

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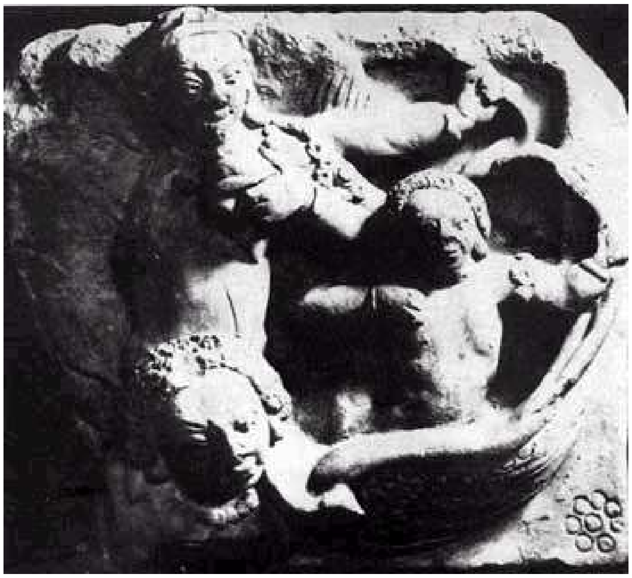
Vedic River Sarasvati. Such a glacial fed river had drained through Uttaranchal, Haryana, Punjab, Rajasthan and Gujarat into the Arabian Sea (Indian Ocean) joining the ocean at Prabhas Patan (Somnath), according to the Mahabharata, which is the sheet-anchor of Bharatiya Itihasa.

What links Vedic River Sarasvati and Nala Setu (Rama Setu) of Valmiki's Ramayana, another Bharatiya itihasa?

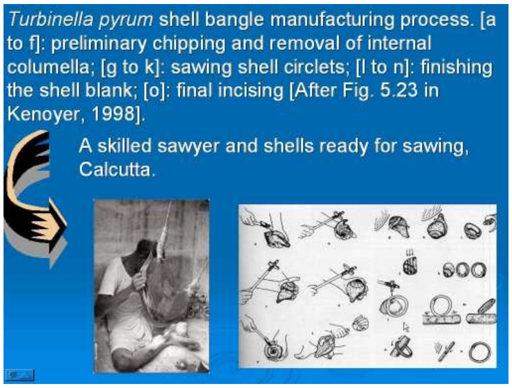
S'ankha (turbinella pyrum) referred to as s'ankha kr.s'a_na in Rigveda (conch pearl). An 8,500 year old industry of Hindu maritime, riverine civilization with its foundations along the coastline and Vedic River Sarasvati basin.

Sri Rama as Vishnu is shown blowing the s'ankha conch in an early common era terracotta panel at Bhitargaon.



Vishnu's fight with the Rakshasas led by Malyavaan, Maali and Sumaali as narrated in the Uttarkanda of the Ramayana (Canto VI-VIII) *A Terracotta Panel from Bhitargaon Showing a Ramayana Scene* By P. Banerjee http://ignca.nic.in/pb0020.htm

•Valmiki describes the construction of Sethu in detail (85 shlokas).



hastimaatraan mahaakaayaaH paaSaaNaamshca mahaabalaaH parvataamshca samutpaaTya yantraiH parivahanti ca *Valmiki Ramayana* 2-22-58

Vaanara having huge bodies, with mighty strength uprooted elephant-sized rocks and mountains and transported them by mechanical contrivances (yantraih).

•In the Mahabharata, Vedavyasa refers to Nalasetu

nalasetur iti khyāto yo 'dyāpi prathito bhuvi rāmasyājñā� purask�tya dhāryate girisa�nibha� *MBh.* 3.267.45

.... which even today, popular on earth as Nala's bridge, mountain-like, is sustained out of respect for [Lord] Rama's command. (Nala was son of Vis'wakarma) Kalidasa's Raghuvams'a (sarga 13): Rama, while returning from SriLanka in pushpaka vimaana: "Behold, Sita, My Sethu of mountains dividing this frothy ocean is like the milky way dividing the sky into two parts"

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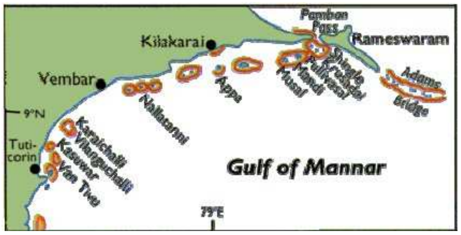
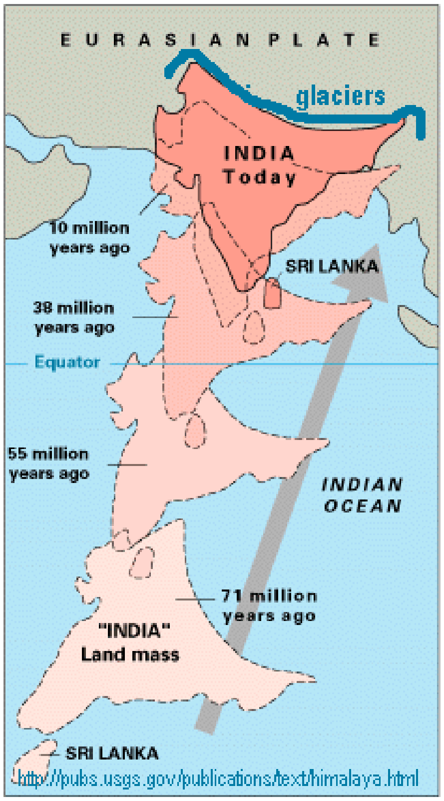
S'ankha industry thrives even today, after 8500 years, in Kilakkarai close to Rama Setu. West Bengal Handicraft Development Corporation has an office here to acquire s'ankha to prepare s'ankha bangles without which no Bengali or Oriya marriage is complete. The bangle is like a mangalasutram for a married woman.

Mohenjodaro: libation vessel made from *turbinella pyrum*. Spiralling lines were incised and filled with red pigment. The vessel is used to anoint kings and to dispense sacred water or milk. Used even today for ritual oblations and to dispense medicinal preparations.[After Fig. 6.38 in Kenoyer, 1998; J. M. Kenoyer, 1983, Shell working industries of the Indus Civilization: an archaeological and ethnographic perspective, PhD diss., UCAL, Berkeley]. 11.4 X 5.4 cm





Turbinella pyrum conch shell trumpet. Hole at apex is roughly chipped. Used to call people for battle or ritually throughout South and Southeast Asia. Essential component of Hindu and Buddhist traditions, one of 8 auspicious symbols. 9.66 X 5.1 cm. Harappa; Lahore Museum, P501.

l6000km. Journey of Bha_rata in 40-50 m. years
lPlate tectonics

2.6.3.2 Dynamic Indian plate, Dynamic Himalayas

A remarkable evidence of the Vedic River Sarasvati as a Himalayan river comes from the evidence of the banks of the river near Adi Badri (forking off from Somb nadi). VMK Puri found a thick layer of metamorphic rocks in the top sections of the embankment clearly demonstrating them to be pebbles brought in from the Himalayas, making Adi Badri the haridwar of River Sarasvati, the place where the glacial river enters the plains carrying the rocks from the Himalayas. As the flow of the waters got reduced (because of the creation of the Yamuna tear in Siwalik ranges with the lateral shift of the ranges caused by plate tectonic events), the river bed shrank into a V-shape leaving the top layers of the emkbankment as witnesses of the ancient times when the Vedic River Sarasvati was a mighty river, gharghara, flowing with stones.

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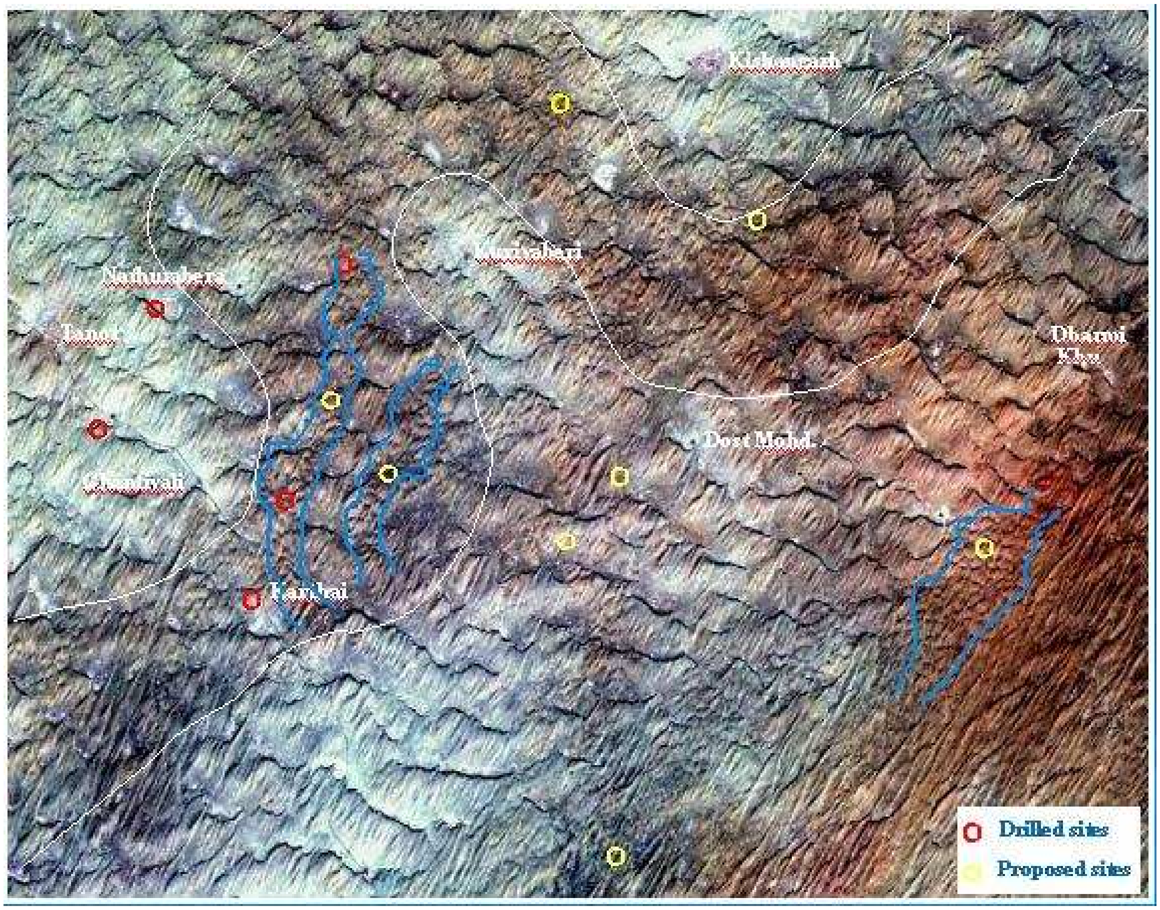

Exploratory well drilling sites in Jaisalmer (Rajasthan) region located on satellite image of 6 km. wide channel of Vedic River Sarasvati. All the wells yielded potable water within a depth of 30 to 60 m. from the surface proving the potential for constructing one million tube wells in central Sarasvati river basin alone with arrangements for recharging using the reborn Sarasvati waters.

The spots were identified using three parameters: 1. proximity to a palaeo-channel (ancient course of a river); 2. proximity to an archaeological site; and 3. proximity to a fault line (fault caused by recurring plate tectonic events which created a tilt in the northwestern Indian plan resulting in river migrations. Yamuna migrated eastwards (carrying Sarasvati waters from Paonta saheb in Himachal Pradesh) to join Ganga to create the Triveni sangamam; Sutlej migrated westwards to abandon Sarasvati at Shatrana and join the Sindhu near Bahawalpur province).

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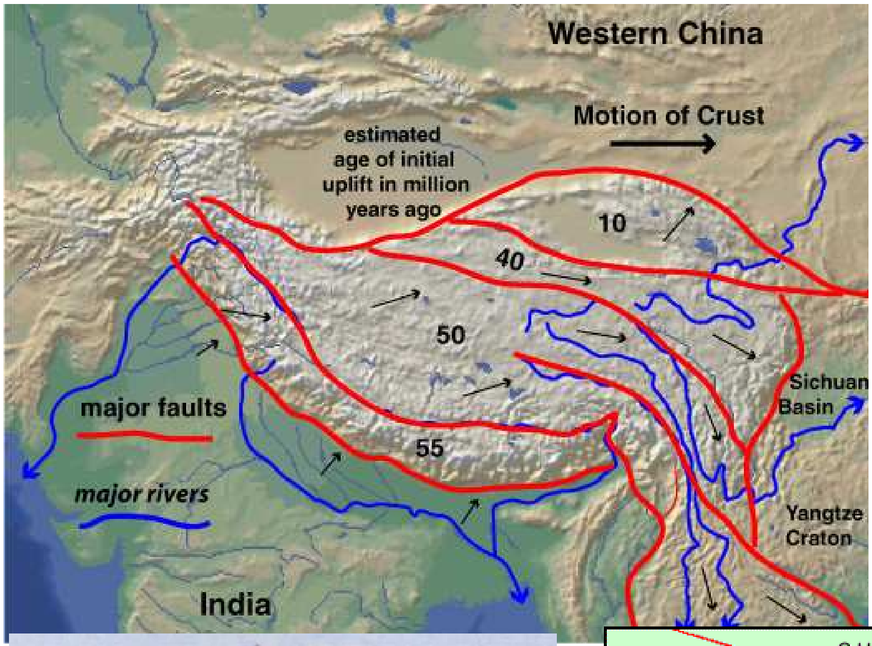
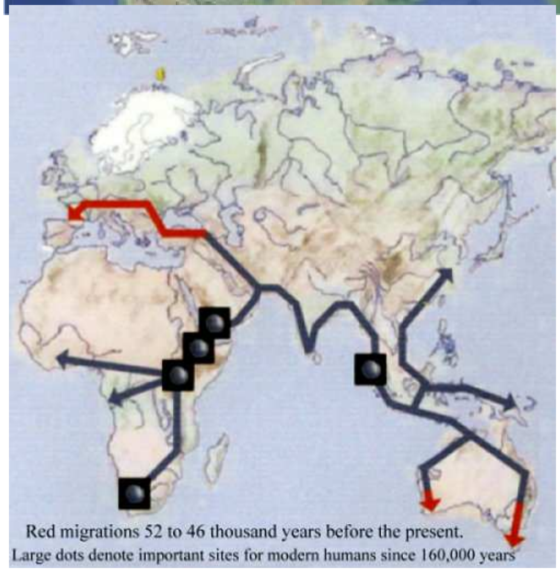
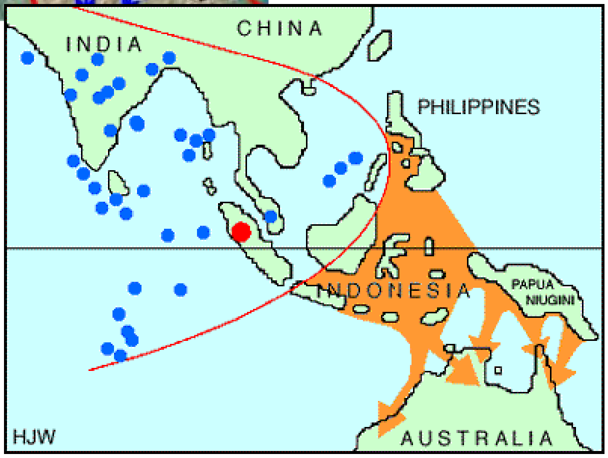


Impact of plate tectonics; Bhuj earthquake on 26 January 2001 and recurrent earthquakes.

After Oppenheimer's online animation of human migration.





http://www.bradshawfoundation.com/stephenoppenheimer/

Lake created and left by the Mt. Toba supereruption

Deposition of ash from the eruption is shown by blue dots.. Red line marks the likely zone inside which population would have been forced to migrate. Could this be a reference to the Great Flood?

[quote] ***Archaeologists*** found the stone tools at a site called Jwalapuram, in Andhra Pradesh, southern India, above and below a thick layer of ash from the eruption of the Toba volcano in Indonesia — an event known as the Youngest Toba Tuff eruption.The tools from each layer were remarkably similar, and Petraglia says that this shows that the huge dust clouds from the eruption didn’t wipe out the population of tool-using people. “Whoever was there seems to have persisted through the eruption,” he says.This is the first archaeological evidence associated with the Toba super

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eruption, says Petraglia, and it contradicts theories that the eruption had a catastrophic effect on the area that its ash blanketed. [unquote] [53]

[quote] **The Toba explosion 74,000 years ago and the genetic evidence by Stephen Oppenheimer**

Perhaps more important than the precision of the dating, the connection between stone tools and Toba volcanic ash in Malaysia puts the first Indians and Pakistanis in the direct path of the greatest natural calamity to befall any humans, ever. The Toba explosion was that disaster, the biggest bang in 2 million years. Carried by the wind, the plume of ash from the volcano fanned out to the north-west and covered the whole of the Indian subcontinent. Even today, a metres-thick ash layer is found throughout the region, and is associated in two Indian locations with Middle and Upper Palaeolithic tools. An important prediction of this conjunction of tools and ash is that a deep and wide genetically sterile furrow would have split East from West; India would eventually recover by re-colonisation from either side. Such a furrow does exist in the **genetic map of Asia**.

In spite of the proximity of Toba to Perak, the Toba ash plume only grazed the Malay Peninsula. The human occupants of the Kota Tampan site were the unlucky ones – others on the peninsula escaped. Some argue, on the basis of comparing skull morphologies, that the Semang aboriginal 'Negrito' hunter-gatherers, who still live in the same part of the dense northern Malaysian rainforest, are descendants of people like Perak Man. The continuity of the Kota Tampan culture as argued by Zuraina Majid provides a link back to the 74,000-year-old tools in the Toba ash.

The Semang are perhaps the best known of the candidate remnants of the old beachcombers. Another relict group possibly left over from the beachcombers in Indo-China and the Malay Peninsula are the so-called Aboriginal Malays, who are physically intermediate between the Semang and Mongoloid populations.

For a film documentary, The Real Eve (Out of Eden in the UK), with with which Stephen Oppenheimer 's book is associated, Discovery Channel helped to fund a genetic survey of the aboriginal groups of the Malay Peninsula which I conducted in collaboration with English geneticist Martin Richards and some Malaysian scientists. This survey was part of a much larger on-going study of East Asian genetics.

The mtDNA results were very exciting: three-quarters of the Semang group (i.e. the 'Negrito' types) have their own unique genetic M and N lines with very little admixture from elsewhere, which is consistent with the view that their ancestors may have arrived with the first beachcombers. Their two unique lines trace straight back to the M and N roots (the first two daughters of L3 outside Africa). Their M line is not shared with anyone else in Southeast Asia or East Asia (or anywhere else) and, although it has suffered loss of diversity through recent population decline, it retains sufficient diversity to indicate an approximate age of 60,000 years. Their other unique group on the N side comes from R, N's genetic daughter. This lack of any specific connection with any other Eurasian population is consistent with the idea that after arriving here so long ago, they have remained genetically isolated in the jungles of the Malay Peninsula.

2.6.3.2 The colonisation of Australia over 60,000 years ago was part of the same Exodus

Some are still convinced that Australian aboriginals represent an earlier migration out of Africa than that which gave rise to Europeans, Asians, and Native Americans. Yet again our genetic trail tells us otherwise. Several studies of Australian maternal clans have shown that they all belong to our two unique non-African superclans, M and N, and large studies of Y chromosomes show that male Australian lines all belong to the same Out-of-Africa Adam clan as other non-Africans (M168). The same pattern is seen with

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[53] http://mathildasanthropologyblog.wordpress.com/2008/03/15/92/

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genetic markers not exclusively transmitted through one parent. In other words, the combined genetic evidence strongly suggests Australians are also descendants of that same single out-of-Africa migration. The logic of this approach, combined with the archaeological dates, places the modern human arrival in the Malay Peninsula before 74,000 years ago and Australia around 65,000 years ago. It is also consistent with the date of exit from Africa predicted on beachcombing grounds.

Date estimates for the trek around the Indian Ocean en route from Africa suggest that the beachcombers could have taken as little as 10,000 years to eat their way down the coastline to Perak and roughly another 10,000 years to reach Australia. Such a time requirement is fulfilled by the difference between leaving Africa around 85,000 years ago and arriving in Australia 65,000 years ago. The former date is consistent with dates estimated for the African L3 cluster expansion using the molecular clock.

2.6.3.3 A genetic furrow in India resulting from the Toba explosion?

There is an abrupt genetic change to the north and east of India. These changes can be inferred even from physical appearance. In Nepal, Burma, and eastern India we come across the first Mongoloid East Asian faces. These populations generally speak East Asian languages, contrasting strongly with their neighbours who mostly speak Indo-Aryan or Dravidian languages. By the time we get to the east of Burma and to Tibet on the northern side of the Himalayas, the transition to East Asian appearance and ethnolinguistic traditions is complete, as is the rapid and complete change of the mitochondrial sub-clans of M and N. In Tibet, for instance, the ratio of M to N clans has changed from 1:5 to 3:1, and there is no convincing overlap of their sub-clans with India. Instead, Tibet shows 70 per cent of typical East and Southeast Asian M and N sub-clans, with the remainder consisting of as-yet unclassified M types of local origin. The north-eastern part of the Indian subcontinent therefore shows the clearest and deepest east–west boundary. This boundary possibly reflects the deep genetic furrow scored through India by the ash-cloud of the Toba volcano 74,000 years ago.

To the south of the Indian peninsula, the main physical type generally changes towards darker-skinned, curly haired, round-eyed so-called Dravidian peoples. Comparisons of skull shape link the large Tamil population of South India with the Senoi, a Malay Peninsular aboriginal group intermediate between the Semang and Aboriginal Malays (see above).

2.6.4 M born in India, N possibly a little farther west in the Gulf

M, who is nearly completely absent from West Eurasia, gives us many reasons to suspect that her birthplace is in India. M achieves her greatest diversity and antiquity in India. Nowhere elsem does she show such variety and such a high proportion of root and unique primary branch types. The eldest of her many daughters in India, M2, even dates to 73,000 years ago. Although the date for the M2 expansion is not precise, it might reflect a local recovery of the population after the extinction that followed the eruption of Toba 74,000 years ago. M2 is strongly represented in the Chenchu hunter-gatherer Australoid tribal populations of Andhra Pradesh, who have their own unique local M2 variants as well as having common ancestors with M2 types found in the rest of India. Overall, these are strong reasons for placing M's birth in India rather than further west or even in Africa.

What is perhaps most interesting about the unique Indian flowerings of the M and R clans is a hint that they represent a local recovery from the Toba disaster which occurred 74,000 years ago, after the out-of-Africa trail began. A devastated India could have been re-colonised from the west by R types and from the east more by M types. Possible support for this picture comes from the recent study by Kivisild and colleagues of two tribal populations in the south-eastern state of Andhra Pradesh. One of these populations, the Australoid Chenchu hunter-gatherers, are almost entirely of the M clan and hold most of the major M branches characteristic of and unique to India. The other group, the non-Australoid Koyas, have a similarly rich assortment of Indian type M branches (60 per cent of all lines), but have 31 per cent uniquely Indian R types. The Chenchu and Koya tribal groups thus hold an ancient library of Indian M and

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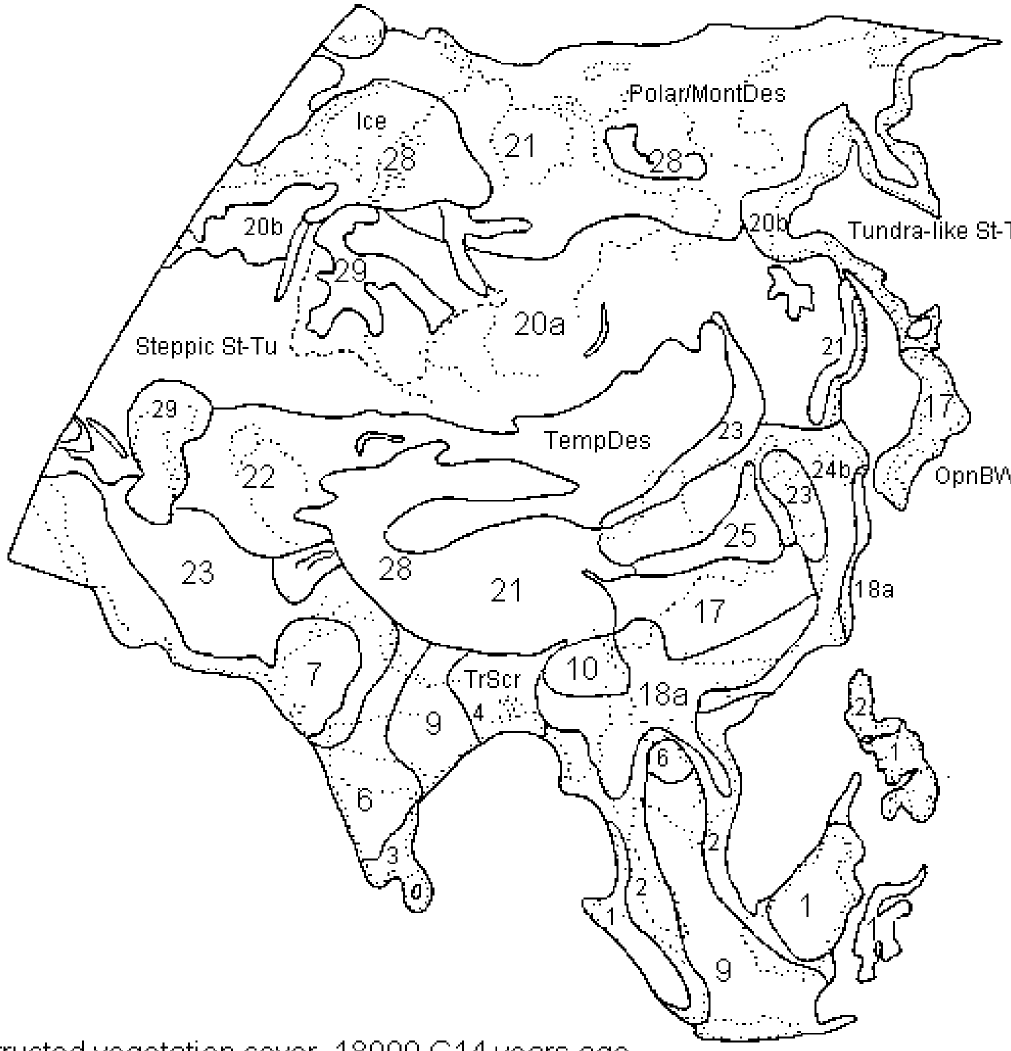
R genetic lines which are ancestral to, and include, much of the maternal genetic diversity that is present in the rest of the Indian subcontinent. Neither of these two groups holds any West Eurasian N types. The presence of R types in the Koyas but not in the Australoid Chenchus might fit with some component of a recolonization from the Western side of the Indian subcontinent. As evidence of their ancient and independent development, and in spite of their clearly Indian genetic roots and locality, there were no shared maternal genetic types (i.e. no exact matches) between the two tribal groups. [unquote]



Reconstructed vegetation cover, 18000 C14 years ago.

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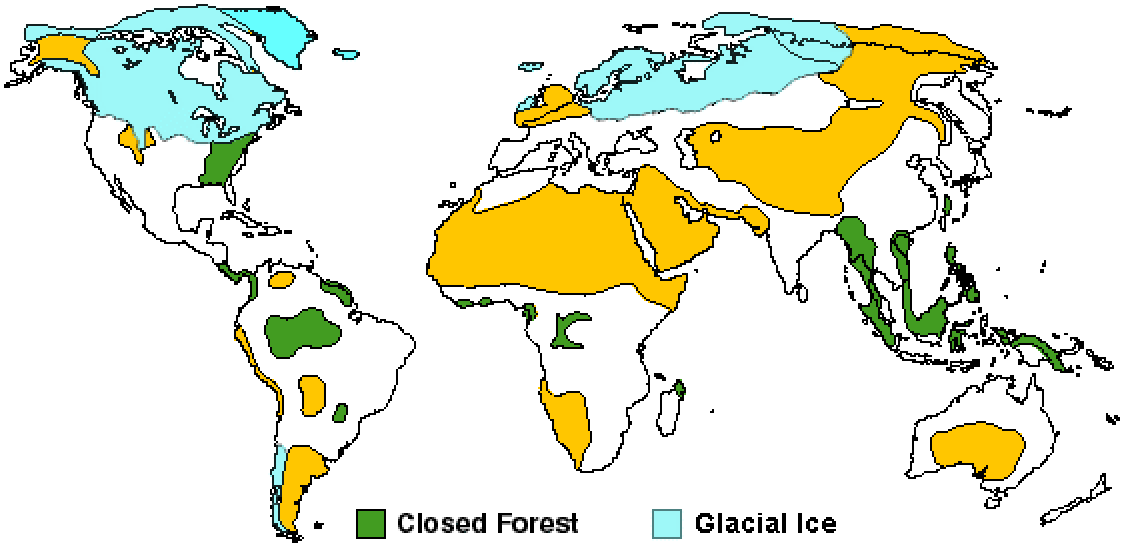
29. Lakes and open water.



Possible causes for climatic changes have been theorized:

(1) Tectonic Causes
Landmass distribution: Shifting continents **(continental drift)** causing changes in circulatory patterns of ocean currents. It seems that whenever there is a large land mass at one of the Earth's poles, either the north pole or south pole, there are ice ages.
Undersea ridge activity: "Sea floor spreading" (associated with continental drift) causing variations in ocean displacement.
(2) Astronomical Causes
21,000 year cycle: Elliptical orbit of the Earth around the Sun (precession of the equinoxes)
41,000 year cycle: Cycle of the **+/- 1.5° wobble in Earth's orbit**
100,000 year cycle: Variations in **solar energy output**
(3) Atmospheric Causes
Heat retention: Due to gases such as carbon dioxide and methane in Earth's atmosphere-- the **"greenhouse effect"**
Solar reflectivity: Due to **clouds, volcanic dust, polar ice caps** [unquote][54]

[54] http://www.lakepowell.net/sciencecenter/paleoclimate.htm

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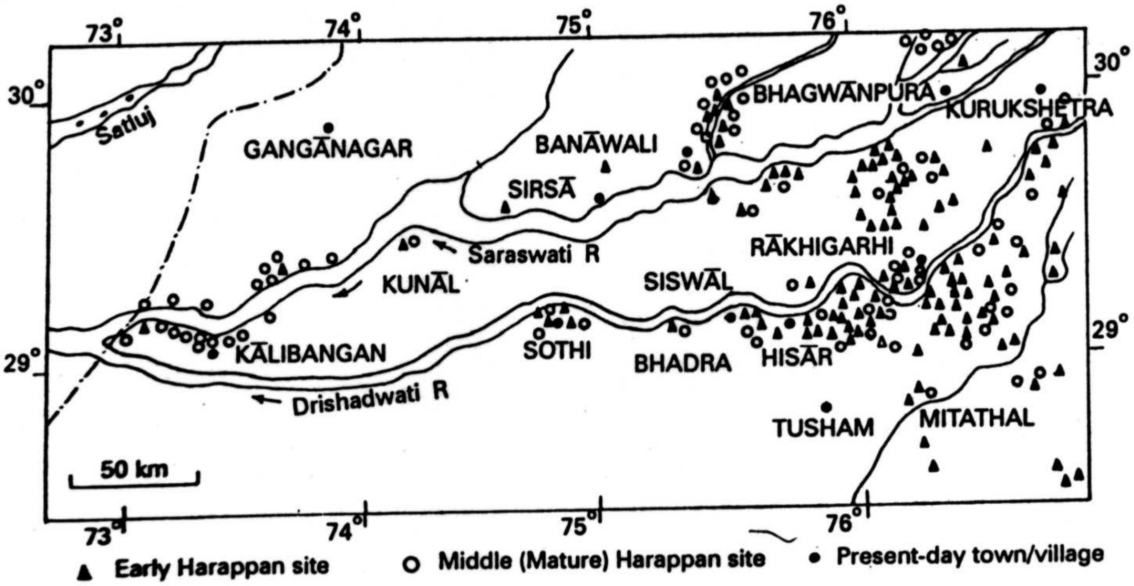
2.6.5 Archaeological settlements in Sarasvati River Basin:

Locations of Kalibangan, Bana_wali, Ra_khigarhi. [After Joshi and Bisht, 1994].



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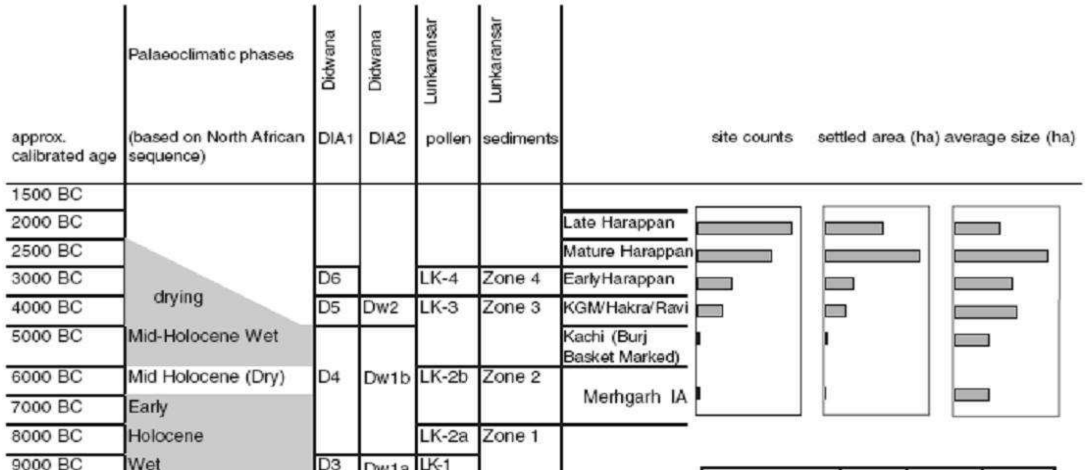

Archaeological Periods	Site counts	Settled area (ha)	Average size (ha)
Late Harappan	1281	4484	3.5
Mature Harappan	1022	7358	7.2
Early Harappan	477	2146	4.5
KGM/Hakra/Ravi	340	1625	4.8
Kachi(Burj)	33	86	2.6
Merhgarh IA	20	52	2.6

Plou

patt

Fig. 9. Summary of the palaeoclimatic phases and archaeological periods in the Greater Indus Valley shown together with site counts and settled area for each period. See text for a discussion.

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Early phases of Hindu civilization was maritime, riverine. A boat shown on a tablet. A present-day boat on Sindhu river. Solid-wheel carts. A boat incised on a tablet. Cart and boat on Sindhu river plying today.

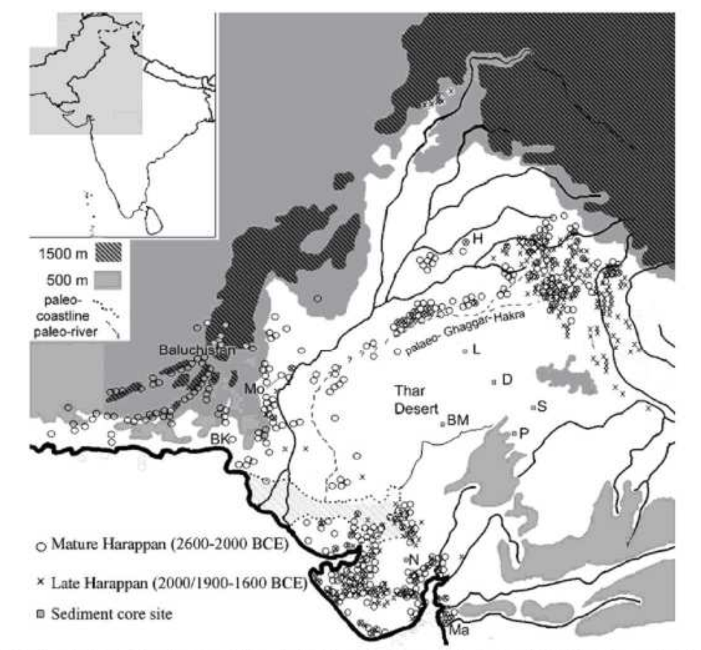
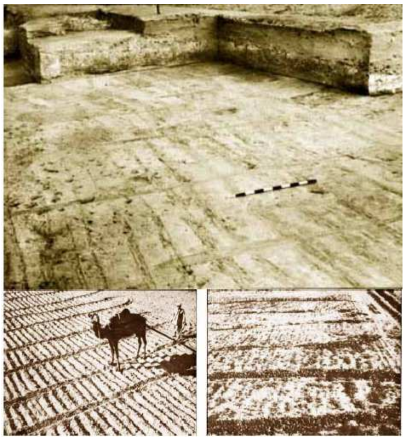


Fig. 1. Map of northwest Indian sub-continent with the archaeological sites of the Harappan Civilisation (circles identify Mature Harappan sites while crosses identify Late Harappan sites; for chronology see Table 1) and palaeoenvironmental records for the region (indicated by squares). Sites discussed in paper are identified by the following abbreviations: BK, Balakot; BM, Bap-Malar playa; D, Didwana Lake; H, Harappa; L, Lunkaransar Lake; Ma, Malvan; Mo, Mohenjo-daro; N, Nal Sarovar; P, Pushkar Lake; S, Sambhar Lake.

Hindu civilization (general chronology markers)



Mesolithic
12,000 to 8,500

Upper palaeolithic	32,000 to 12,000
Middle palaeolithic	102,000 to 32,000
Lower palaeolithic	+70,000 to 100,000
Metals age	8,500 to 3,300
Ochre-coloured	
(Lustrous redware)	3,500 to 3300
Painted Greyware	2800 to 2400
Black polishedware	2600 to 2400

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2.6.6 Archaeologically attested chronology markers

ØMehergarh, 6500 BCE (s'ankha)
ØBhirdana 4536 BCE (pit-dwelling)
ØKunal 3200-1700 BCE (Necklace of gold-disc)
ØBalu 2500-1700 BCE
ØBanawali 2500-1450 BCE
ØRakhigarhi 2500-1450 BCE
ØSiswal 2450 BCE
ØHarappa 2400 BCE (Copper furnace)
ØØGanga valley, iron age 1540 BCE (Iron smelter)
ØBurzahom 4000 years BP (Kashmir) (pit-dwelling)
ØNarsingdi 4000 years BP (Bangladesh) (pit-dwelling)

Damaged circular clay furnace, comprising iron slag and tuyeres and other waste materials stuckc with its body, exposed at Lohsanwat mound, Period II, Malhar, Dist. Chandauli (ca. 1800 BCE).[55]

The iron smelter of Lohardewa is comparable to the circular copper kiln of Harappa.

[55] http://antiquity.ac.uk/projgall/tewari/tewari.pdf Rakesh Tewari, 2003, The origins of iron working in India: new evidence from the Central Ganga Plain and the Eastern Vindhyas.

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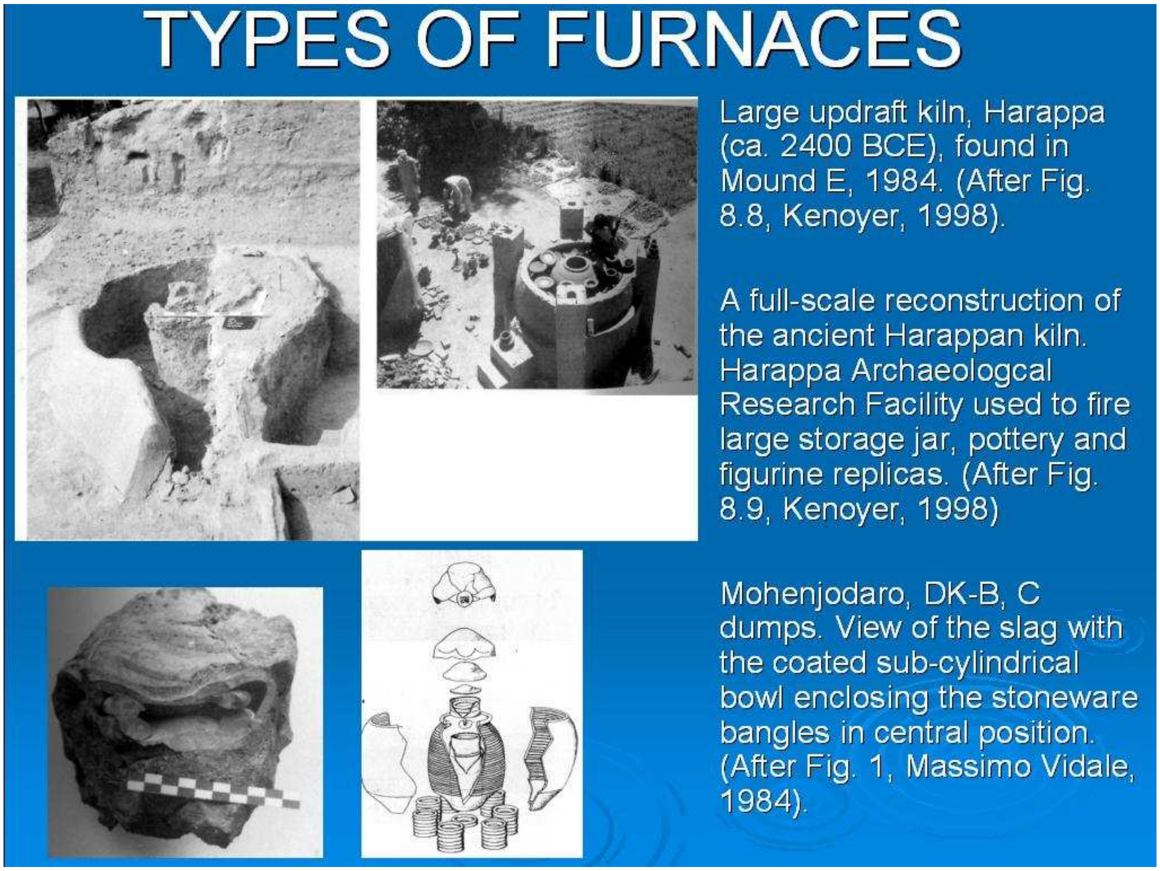
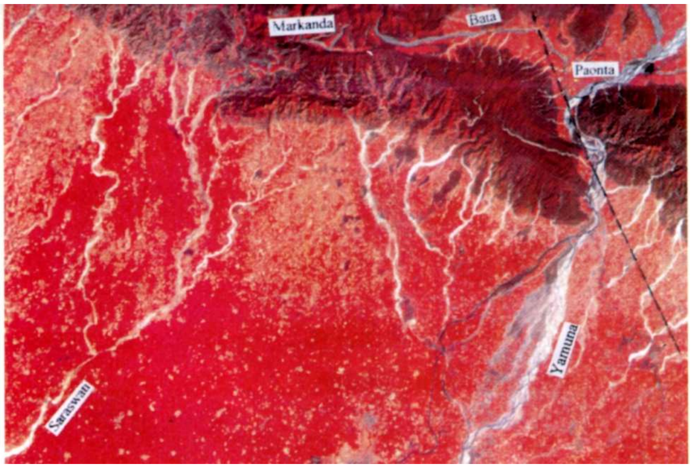


Many large archaeological sites are on Sarasvati river basin:

Lakhmirwala (Bhatinda) [225 ha.
Rakhigari (Hissar) [224 ha.]
Gurnikalan One (Bhatinda) [144 ha.]
Hasanpur (Bhatinda) [100 ha.]
Mohenjo-daro (Larkana) [100 ha.]
Harappa (Sahiwal) [100 ha.]

Due to plate tectonics, Siwalik ranges shifted laterally creating a gap near Paonta Saheb. Yamuna captured waters of Sarasvati and took them to Ganga to create the Triveni Sangamam. [Satellite image: NRSA, ISRO, Hyderabad]



Rishi as'rama for rishi tarpan.am and annual melas continue even today, presenting the most emphatic evidence of received cultural memory of River Sarasvati. Balarama visited many Diffusion of rice cultivation from Asia.

rishi a_s'ramas during his pariyatra along Vedic River Sarasvati:
:
ØCyavana: Candi
ØKapila: S'rikolayatji

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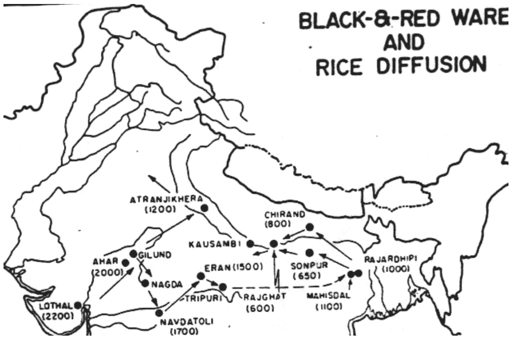
ØYajnavalkya, s’aunaka: Jageri, Bikaner
ØVasishtha: Pehoa (Pr.thudaka)
ØMarkandeya: Markanda nadi
ØSamkhya-Kapila – Kalayat
ØGalava - Guldera
ØSalihotra-Asva Shastra –Sarsa
ØLomaharsha –Lohar Majra
ØShringi –Saghan
ØVyasa-Vyasasthali
ØGautama-Gondar
ØJamadagni –Jalmana
ØYayati Tirtha and Surya Kund, Kalwa

Tamil Velir kings coming from Dwaraka. 49 generations ago is cited in Sangam text (Puranaanuru):

neeye, vad.apa_l munivan tad.avinul. to_nr-i
cempu punaintu iyar-r-iya ce_n.ned.um puricai
uvara_ i_kai tuvarai a_n.t.u
na_r-pattonpadu var..imur-ai vanta
ve_l.irul. ve_l.e_ vir-ar- po_r an.n.al
ta_r an.i ya_naic ce_t.t.u irunko_ve

tuvarai a_n.t.u na_r-pattonpadu var..mur-ai vanta ve_l.irul. ve_l.e means 'king among kings, ruling Dwaraka and descending from 49 generations' and refers to a Cera king (i.e. king in Kerala).

Averaging 25 years per generation, the 49 generations mentioned in this verse traces the genealogy of ve_l.ir back by 1225 years. If the movement of the people (yadava, a_yarkulam) from Dwaraka is related to the submergence of Dwaraka as mentioned in the mausala parvan of Mahabharata, the early presence of ve_l.ir in Dwaraka may be traced to c. 3000 BCE and hence, dating the ve_l.ir of Sangam Age in southern Bharat to 1775 BCE (that is 3000 BCE minus 1225).



Map showing the probably diffusion of the black-and-red ware techniques and rice cultivation, based on C-14 dates (given in brackets). The earliest appearance of the Black and Red ware is in Lothal (2200 BCE) and next comes Ahar (2000 BCE). The settlement evidence of this chalcolithic culture and the continuity of the vedic traditions in all parts of India indicate an indigenous development of the civilization from ca. 3000 BCE to 650 BCE (Sonpur).

The grand narrative which emerges from the genetic studies is clear and emphatic. Peopling of India was an indigenous and autochthonous evolution. There are markers of gene flows OUT of India. All so-called jaati or vanavaasi groups are of the same gene pool of India. This is consistent with the work, Indus script encodes mleccha speech which demonstrates the essential semantic unity of all bharatiya or Indian languages in a linguistic area of Sarasvati civilization from ca. 7500 BCE.

2.6.6 Peopling of South Asia: investigating the caste-tribe continuum in India

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Gyaneshwar Chaubey (2008) provides a lucid account of genetic evidence related to the peopling of India.[56] His summary is instructive: "Enormous amount of cultural and biological versatility is present in flora and fauna of Indian subcontinent, establishing its significance to study the diversity and population histories. Our results indicate that the tribal as well as caste populations of Indian subcontinent practicing a very high level of endogamy albeit they live in a close proximity and share the ritual customs. The present caste and tribal populations largely have a common stock of maternal as well as paternal Pleistocene heritage. They make a distinct cluster with other continental populations, advocating an *in-situ* demographic expansion just after the first arrival of modern humans from Africa. Genetic data doesn't support any major influx to subcontinent in recent time and gainsay Aryan-invasion theory, nonetheless, it support Out-of-India theory. Indigenous origin of caste system is more plausible. Overall, our comprehensive study suggests that the several evolutionary forces (founder effects, gene flow and genetic drift) and factors (geographical, linguistic and cultural barriers) have produced the current phylogeography of present Indian gene pool." He further elucidates: "There are the four main language families spoken in India. Largest group, Indo-Europeans are prevalent in northern, central and western India. The second largest, the Dravidian family, covers the majority of the languages in the south. Austro-Asiatic speakers live mainly in east while Tibeto-Burmans resides in north eastern region. Most of the Indo-European speakers belong to castes, whereas the majority of the tribal populations speak languages from the other three families. Dravidian speaking populations also have the same type of caste hierarchy as in Indo-European. Indo-European and Dravidian largely share the same maternal and paternal genepool (Chaubey et al. 2008b). Additionally, the language shift phenomenon also shaped the present language phyla of Indian subcontinent (for detailed see Chaubey et al. 2008a). Thus, it is not wise to relate the initial Palaeolithic settlers of India on the basis of certain linguistic affiliations because language groups are much younger than deeply rooted genetic lineages. Origin of Austro-Asiatic groups is not very clear yet. There are two rival models about their origin, one suggest their origin in South east Asia and further migration to India (Diamond and Bellwood 2003; Sengupta et al. 2006; Sahoo et al. 2006), while other advocate their migration from Africa as a first settler (Basu et al. 2003; Kumar et al. 2007). Studies on mtDNA diversity have shown that the Austro-Asiatic speakers from Southeast Asia and the Indian subcontinent, carry mtDNAs of different stocks (Black et al. 2006; Chaubey et al. 2008a,b). Similarly, the Indian tribes speaking Austro-Asiatic language harbour the same autochthonous mtDNA haplogroup composition as the Indo European and Dravidic groups of India (Metspalu et al. 2004; Chaubey et al. 2008a,b). In contrast, the AA speaking populations of Indian and Southeast Asian's Y chromosomes share a common marker, M95, which defines a single branch (O2a) of haplogroup O. Haplogroup O distribution

[56] Gyaneshwer Chaubey, 2008, Peopling of India, Genetic markers speak out!, Paper presented in the Vedic River Sarasvati and Hindu Civilization Conference, New Delhi. Gyaneshwer is a researcher at Department of Evolutionary Biology, Institute of Molecular and Cell Biology, University of Tartu and Estonian Biocentre, Tartu, Estonia

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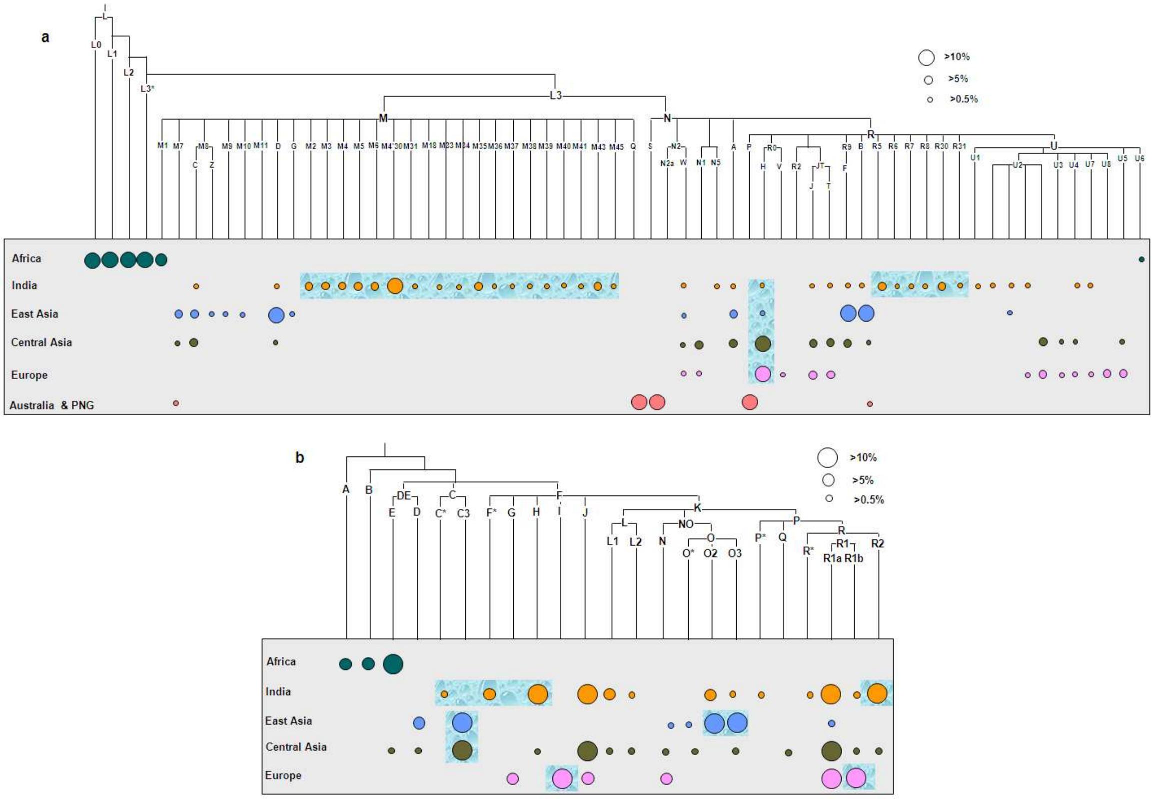
and frequency put forward its origin further East to Indian subcontinent so, it is more likely that O2a originated in South east Asia and was brought by Austro-Asiatic speakers to India… The maternal Indian haplogroups shows an autochthonous origin (Thangaraj et al. 2006). All the haplogroups emerge from the basal node and they are deeply rooted (Fig.1). However, a West Eurasian and East Asian sharing of haplogroups are also observed in Indian subcontinent (Fig. 2), but most of them share their ancestry to India subcontinent well beyond the Last Glacial Maximum. In paternal genepool both Indo-European as well as Dravidian speakers show a high combined frequency of haplogroups C5, L, H, and R2 which are autochthonous to the subcontinent (Sahoo et al. 2006; Sengupta et al. 2006). The total frequency of these four haplogroups outside of India is marginally low and the dispersion of these haplogroups from India was due to several pre-historical/historial episodes which corroborate out of India theory (Fig.1)… the current data do not support a model that says a recent genetic input from Central Asia to explain the present genetic variation of India. It also suggests an autochthonous entrenched caste origin which goes back to pre-Vedic period."



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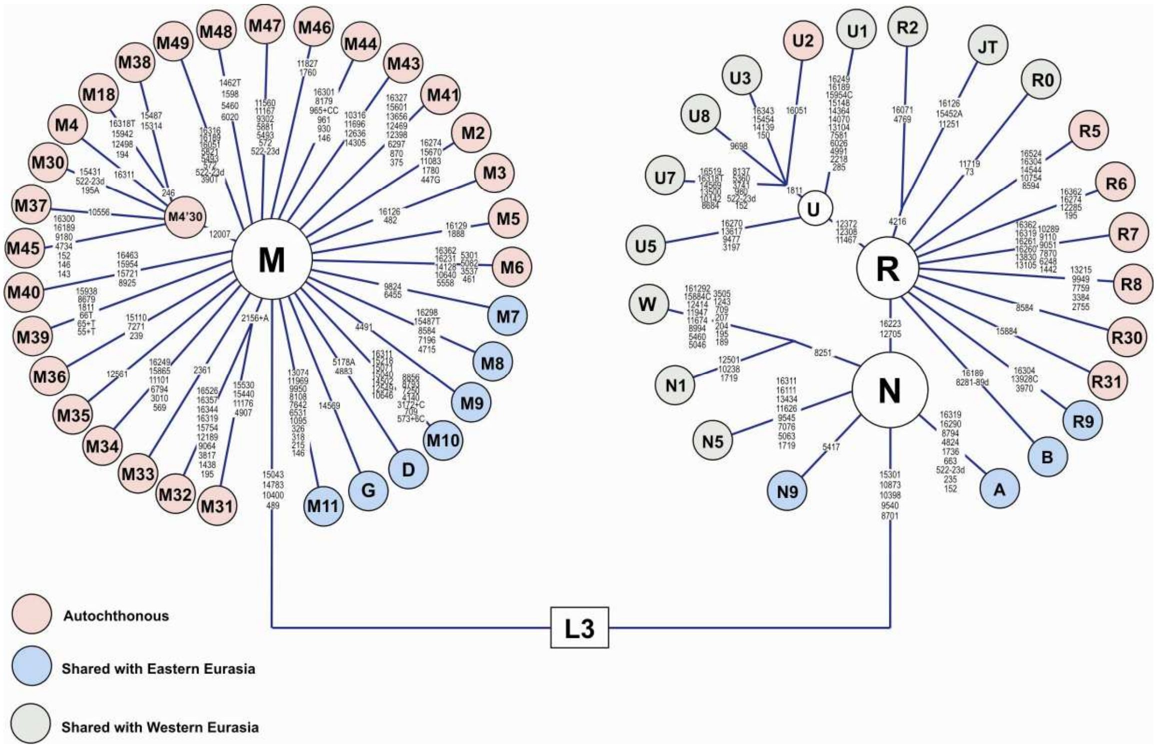

Chaubey G, **Metspalu M**, **Kivisild T**, **Villems R**. Department of Evolutionary Biology, Institute of Molecular and Cell Biology, University of Tartu and Estonian Biocentre, Tartu, Estonia. gyanc@ebc.ee
In recent years, mtDNA and Y chromosome studies involving human populations from South Asia and the rest of the world have revealed new insights about the peopling of the world by anatomically modern humans during the late Pleistocene, some 40,000-60,000 years ago, over the southern coastal route from Africa. Molecular studies and archaeological record are both largely consistent with autochthonous differentiation of the genetic structure of the caste and tribal populations in South Asia. High level of endogamy created by numerous social boundaries within and between castes and tribes, along with the influence of several evolutionary forces such as genetic drift, fragmentation and long-term isolation, has kept the Indian populations diverse and distant from each other as well as from other continental populations. This review attempts to summarize recent genetic studies on Indian caste and tribal populations with the focus on the information embedded in the socially defined structure of Indian populations. [57]

2.6.7 Genetic studies indicate autochthonous peopling of India and no evidence for Aryan Invasion/Migration

Michel Danino has noted, in a remarkably precise summary of researches related to the 'Aryan' problem: [quote] In the Indian context, we are now familiar with the work of U.S anthropologists Kenneth Kennedy, John Lukacs and Brian Hemphill.[58] Their chief conclusion, as far as the Aryan debate is concerned, is that

[57] PMID: 17187379 [PubMed - indexed for MEDLINE] http://www.ncbi.nlm.nih.gov/pubmed/17187379?ordinalpos=15&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

[58] (1) B. E. Hemphill, J. R. Lukacs & K. A. R. Kennedy, "Biological adaptations and affinities of the Bronze Age Harappans," in Harappa Excavations 1986-1990: A Multidisciplinary Approach to Third Millennium Urbanism, ed. R. H. Meadow (Madison: Prehistory Press, 1991), pp. 137-182. (2) Kenneth A. R. Kennedy, "Have Aryans been identified in the prehistoric skeletal record from South Asia?" in The Indo-Aryans of Ancient South Asia, ed. George Erdosy (Berlin & New York: Walter de Gruyter, 1995), pp. 32-66. (3) Brian

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there is no trace of "demographic disruption" in the North-West of the subcontinent between 4500 and 800 BCE; this negates the possibility of any massive intrusion, by so-called Indo-Aryans or other populations, during that period.

In the 1980s, another powerful tool of inquiry came on the scene: genetics…In trying to reconstruct ancestry, biologists use two types of DNA, the complex molecule that carries genetic information. The first, Y-DNA, is contained in the Y- chromosome, one of the two sex chromosomes; it is found in the cell's nucleus and is transmitted from father to son. The second, mtDNA or mitochondrial DNA, is found in mitochondria, kinds of power generators found in a cell, but outside its nucleus; this mtDNA is independent of the Y-DNA, simpler in structure, and transmitted by the mother alone. For various reasons, all this genetic material undergoes slight alterations or "mutations" in the course of time; those mutations then become characteristic of the line of descendants: if, for instance, the mtDNAs of two humans, however distant geographically, exhibit the same mutation, they necessarily share a common ancestor in the maternal line. Much of the difficulty lies in organizing those mutations, or genetic markers, in consistent categories called "haplotypes" (from a Greek word meaning "single"), which constitute an individual's genetic fingerprint. Similar haplotypes are then brought together in "haplogroups," each of which genetically identifies a particular ethnic group. Such genetic markers can then be used to establish a "genetic distance" between two populations. Identifying and making sense of the right genetic markers is not the only difficulty; dating their mutations remains a major challenge: on average, a marker of Y- DNA may undergo one mutation every 500 generations, but sudden changes caused by special circumstances can never be ruled out. Genetics, therefore, needs the inputs from palaeontology and archaeology, among other disciplines, to confirm its historical conclusions…

The first such study dates back to 1999 and was conducted by the Estonian biologist Toomas Kivisild, a pioneer in the field, with fourteen co-authors from various nationalities (including M. J. Bamshad).[59] It relied on 550 samples of mtDNA and identified a haplogroup called "U" as indicating a deep connection between Indian and Western-Eurasian populations. However, the authors opted for a very remote separation of the two branches, rather than a recent population movement towards India; in fact, "the subcontinent served as a pathway for eastward migration of modern humans" from Africa, some 40,000 years ago: "We found an extensive deep late Pleistocene genetic link between contemporary Europeans and Indians, provided by the mtDNA haplogroup U, which encompasses roughly a fifth of mtDNA lineages of both populations. Our estimate for this split [between Europeans and Indians] is close to the suggested time for the peopling of Asia and the first expansion of anatomically modern humans in Eurasia and likely pre-dates their spread to Europe."

In other words, the timescale posited by the Aryan invasion / migration framework is inadequate, and the genetic affinity between the Indian subcontinent and Europe "should not be interpreted in terms of a recent admixture of western Caucasoids with Indians caused by a putative Indo-Aryan invasion 3,000–4,000 years BP."

The second study was published just a month later. Authored by U.S. biological anthropologist Todd R. Disotell, [60]it dealt with the first migration of modern man from Africa towards Asia, and found that

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E. Hemphill, Alexander F. Christensen & S. I. Mustafakulov, "Trade or Travel: An Assessment of Interpopulational Dynamics among Bronze Age Indo-Iranian Populations," South Asian Archaeology, 1995, ed. Raymond Allchin & Bridget Allchin (New Delhi: Oxford & IBH Publishing, 1997), vol. 2, pp. 855- 871.

[59] T. Kivisild, M. J. Bamshad, K. Kaldma, M. Metspalu, E. Metspalu, M. Reidla, S. Laos, J. Parik, W. S. Watkins, M. E. Dixon, S. S. Papiha, S. S. Mastana, M. R. Mir, V. Ferak, R.Villems, "Deep common ancestry of Indian and western-Eurasian mitochondrial DNA lineages" in *Current Biology*, 18 November 1999, 9(22):1331-4.

[60] T. R. Disotell, "Human evolution: the southern route to Asia" in *Current Biology*, vol. 9, No. 24, 16 December 1999, pp. R925-928(4).

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migrations into India "did occur, but rarely from western Eurasian populations." Disotell made observations very similar to those of the preceding paper: "The supposed Aryan invasion of India 3,000–4,000 years before present therefore did not make a major splash in the Indian gene pool. This is especially counter-indicated by the presence of equal, though very low, frequencies of the western Eurasian mtDNA types in both southern and northern India. Thus, the 'caucasoid' features of south Asians may best be considered 'pre-caucasoid' — that is, part of a diverse north or north-east African gene pool that yielded separate origins for western Eurasian and southern Asian populations over 50,000 years ago."

Here again, the Eurasian connection is therefore traced to the original migration out of Africa. On the genetic level, "the supposed Aryan invasion of India 3000-4000 years ago was much less significant than is generally believed."

A year later, thirteen Indian scientists led by Susanta Roychoudhury studied 644 samples of mtDNA from some ten Indian ethnic groups, especially from the East and South.[61] They found "a fundamental unity of mtDNA lineages in India, in spite of the extensive cultural and linguistic diversity," pointing to "a relatively small founding group of females in India." Significantly, "most of the mtDNA diversity observed in Indian populations is between individuals within populations; there is no significant structuring of haplotype diversity by socio-religious affiliation, geographical location of habitat or linguistic affiliation." That is a crucial observation, which later studies will endorse: on the maternal side at least, there is no such thing as a "Hindu" or "Muslim" genetic identity, nor even a high- or low-caste one, a North- or South-Indian one — hence the expressive title of the study: "Fundamental genomic unity of ethnic India is revealed by analysis of mitochondrial DNA."

…Kivisild directed two fresh studies. The first, with nine colleagues, dealt with the origin of languages and agriculture in India.[62] Those biologists stressed India's genetic complexity and antiquity, since "present-day Indians [possess] at least 90 per cent of what we think of as autochthonous Upper Palaeolithic maternal lineages." They also observed that "the Indian mtDNA tree in general [is] not subdivided according to linguistic (Indo-European, Dravidian) or caste affiliations," which again demonstrates the old error of conflating language and race or ethnic group.

… Mait Metspalu and fifteen co-authors analyzed 796 Indian (including both tribal and caste populations from different parts of India) and 436 Iranian mtDNAs.[63] (They observed): "Language families present today in India, such as Indo-European, Dravidic and Austro-Asiatic, are all much younger than the majority of indigenous mtDNA lineages found among their present-day speakers at high frequencies. It would make it highly speculative to infer, from the extant mtDNA pools of their speakers, whether one of the listed above linguistically defined group in India should be considered more 'autochthonous' than any other in respect of its presence in the subcontinent."

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[61] Susanta Roychoudhury, Sangita Roy, Badal Dey, Madan Chakraborty, Monami Roy, Bidyut Roy, A. Ramesh, N. Prabhakaran, M. V. Usha Rani, H. Vishwanathan, Mitashree Mitra, Samir K. Sil & Partha P. Majumder, "Fundamental genomic unity of ethnic India is revealed by analysis of mitochondrial DNA," *Current Science, vol. 79, No. 9, 10* November 2000, pp. 1182-1192.

[62] Esien Usanga, Sarabjit Mastana, Surinder S. Papiha & Richard Villems, "The Genetics of Language and Farming Spread in India," ch. 17 in *Examining the farming/language dispersal hypothesis*, eds. Peter Bellwood & Colin Renfrew (Cambridge: McDonald Institute for Archaeological Research, 2003), pp. 215–222.

[63] Mait Metspalu, Toomas Kivisild, Ene Metspalu, Jüri Parik, Georgi Hudjashov, Katrin Kaldma, Piia Serk, Monika Karmin, Doron M Behar, M Thomas P Gilbert, Phillip Endicott, Sarabjit Mastana, Surinder S. Papiha, Karl Skorecki, Antonio Torroni & Richard Villem, "Most of the extant mtDNA boundaries in South and Southwest Asia were likely shaped during the initial settlement of Eurasia by anatomically modern humans," *BMC Genetics* 2004, 5:26.

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… Another Indian biologist, Sanghamitra Sahoo, headed eleven colleagues, including T. Kivisild and V. K. Kashyap, for a study of the Y-DNA of 936 samples covering 77 Indian populations, 32 of them tribes.[64] "The sharing of some Y-chromosomal haplogroups between Indian and Central Asian populations is most parsimoniously explained by a deep, common ancestry between the two regions, with diffusion of some Indian- specific lineages northward." So the southward gene flow that had been imprinted on our minds for two centuries was wrong, after all: the flow was out of, not into, India. The authors continue: "The Y-chromosomal data consistently suggest a largely South Asian origin for Indian caste communities and therefore argue against any major influx, from regions north and west of India, of people associated either with the development of agriculture or the spread of the Indo-Aryan language family." The last of the two rejected associations is that of the Indo-Aryan expansion; the first, that of the spread of agriculture, is the well-known thesis of Colin Renfrew,19 which traces Indo-European origins to the beginnings of agriculture in Anatolia, and sees Indo-Europeans entering India around 9000 BP, along with agriculture: Sanghamitra Sahoo et al. see no evidence of this in the genetic record. The same data allow the authors to construct an eloquent table of genetic distances between several populations, based on Y-haplogroups (Fig.). We learn from it, for instance, that "the caste populations of 'north' and 'south' India are not particularly more closely related to each other (average Fst value = 0.07) than they are to the tribal groups (average Fst value = 0.06)," an important confirmation of earlier studies. In particular, "Southern castes and tribals are very similar to each other in their Y-chromosomal haplogroup compositions." As a result, "it was not possible to confirm any of the purported differentiations between the caste and tribal pools," a momentous conclusion that directly clashes with the Aryan paradigm, which imagined Indian tribes as adivasis and the caste Hindus as descendants of Indo-Aryans invaders or immigrants.

	North castes	South castes	Reduced tribes	Northeast-east tribes	Turkey	Central Asia	Mongols/Buryats	Southeast Asia	Iran	Iraq	East Europe	Russia	West Europe	Ethiopia
North castes	0.00													
South castes	0.07	0.00												
Reduced tribes	0.06	0.05	0.00											
Northeast-east tribes	0.21	0.20	0.19	0.00										
Turkey	0.11	0.14	0.13	0.21	0.00									
Central Asia	0.07	0.12	0.10	0.19	0.05	0.00								
Mongols/Buryats	0.26	0.27	0.26	0.32	0.21	0.12	0.00							
Southeast Asia	0.26	0.27	0.26	0.21	0.22	0.19	0.30	0.00						
Iran	0.09	0.12	0.11	0.22	0.01	0.06	0.24	0.24	0.00					
Iraq	0.16	0.19	0.17	0.26	0.04	0.10	0.27	0.27	0.02	0.00				
East Europe	0.08	0.23	0.19	0.33	0.16	0.11	0.34	0.34	0.18	0.23	0.00			
Russia	0.08	0.20	0.16	0.29	0.11	0.06	0.28	0.30	0.13	0.18	0.03	0.00		
West Europe	0.26	0.29	0.25	0.35	0.14	0.17	0.36	0.36	0.22	0.23	0.28	0.19	0.00	
Ethiopia	0.31	0.33	0.32	0.39	0.21	0.27	0.40	0.39	0.21	0.24	0.40	0.37	0.42	0.00

Fig. 1. Genetic distances between populations estimated from Y-haplogroup frequencies
(from Sanghamitra Sahoo et al., "A prehistory of Indian Y chromosomes: Evaluating demic diffusion scenarios").

2.6.8 Reality of Vedic River Sarasvati and genetic researches establish 'Aryan invasion' theories as myths

Just as the imaginary Aryan invasion / migration left no trace in Indian literature, in the archaeological and the anthropological record, it is invisible at the genetic level. The agreement between these different fields is remarkable by any standard, and offers hope for a grand synthesis in the near future, which will also integrate agriculture and linguistics. Secondly, they account for India's considerable genetic diversity

[64] Sanghamitra Sahoo, Anamika Singh, G. Himabindu, Jheelam Banerjee, T. Sitalaximi, Sonali Gaikwad, R. Trivedi, Phillip Endicott, Toomas Kivisild, Mait Metspalu, Richard Villems, & V. K. Kashyap, "A prehistory of Indian Y chromosomes: Evaluating demic diffusion scenarios," *Proceedings of the National Academy of Sciences*, 24 January 2006, vol. 103, No. 4, pp. 843–848.

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by using a time- scale not of a few millennia, but of 40,000 or 50,000 years...Oppenheimer, a leading advocate of this scenario, summarizes it in these words:

“For me and for Toomas Kivisild, South Asia is logically the ultimate origin of M17 and his ancestors; and sure enough we find the highest rates and greatest diversity of the M17 line in Pakistan, India, and eastern Iran, and low rates in the Caucasus. M17 is not only more diverse in South Asia than in Central Asia, but diversity characterizes its presence in isolated tribal groups in the south, thus undermining any theory of M17 as a marker of a ‘male Aryan invasion’ of India. One average estimate for the origin of this line in India is as much as 51,000 years. All this suggests that M17 could have found his way initially from India or Pakistan, through Kashmir, then via Central Asia and Russia, before finally coming into Europe.” [65]
…India acted “as an incubator of early genetic differentiation of modern humans moving out of Africa.”[unquote]

[65] Stephen Oppenheimer, The Real Eve: Modern Man’s Journey out of Africa (New York: Carroll & Graf Publishers, 2003, p. 152). See an introduction to Oppenheimer’s theory on the website: www.bradshawfoundation.com. Excerpted from: http://www.archaeologyonline.net/artifacts/genetics-aryan-debate.html

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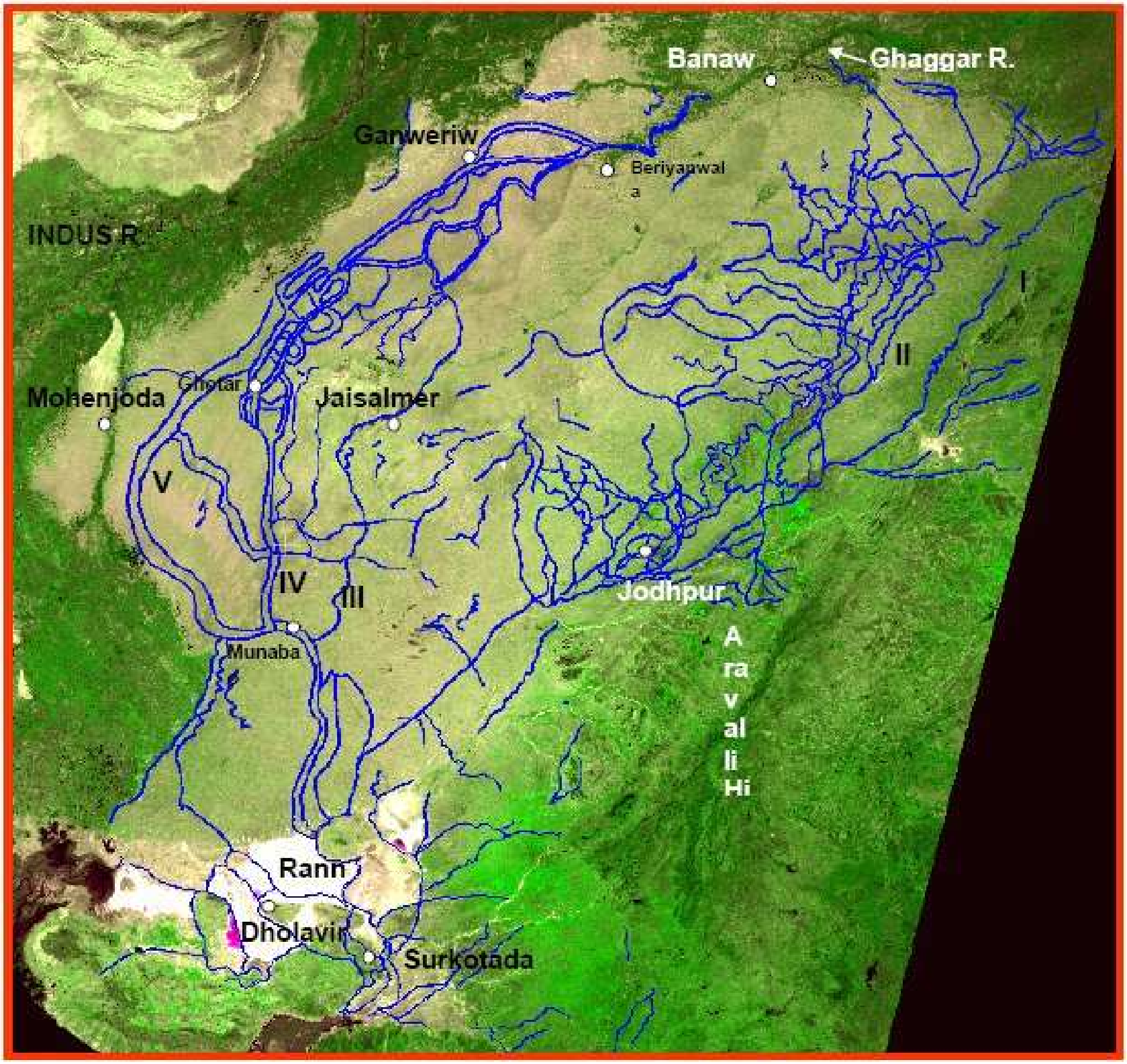
Chapter 3. Revival of River Sarasvati (impetus for National Water Grid)



Vedic River Sarasvati – ancient courses mapped by ISRO **(RRSSC, Jodhpur).**. A map which adorns the PM's office.

The entire course of Vedic River Sarasvati has been traced from Manasarovar (Mt. Kailas) to Prabhas Patan (Somnath) in Gujarat. This is a historic achievement.

Sarasvati Nadi Shodh Prakalp

Sarasvati Nadi Shodh Prakalp is a project of Akhila Bharatiya Itihasa Sankalana Yojana, dedicated to researching on Sarasvati River civilization and to bring the Vedic River Sarasvati alive again to benefit over 20 crore people of Northwest Bharatam.

The flow of Manasarovar glacial waters of Mt. Kailas, can be extended from Gedra Road in Barmer Dist. (Rajasthan) into Gujarat immediately. Only 150 kms. of canal work has to be carried out which can be jointly done by Rajasthan and Gujarat Governments.

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The arrival of Sarasvati Nadi maa into Gujarat will be an unparalleled technological marvel of the 21st century.

The revival of River Sarasvati is proceeding apace as part of the National Water Grid (Inter-linking of rivers, master plan drawn by National Water Development Agency) and the waters of Manasarovar flowing through Rivers Sutlej and Beas have been taken into the Rajasthan Nahar (called Sarasvati Mahanadi Roopaa Nahar). The Sarasvati Nahar waters have now reached upto Gedra Road in Barmer Dist. after traversing a distance of about 1000 kms. Another 150 kms. extension of this nahar will ensure that Sarasvati river waters will reach Rann of Kutch and Gujarat.

Work has begun in Haryana to revive the flow of waters in the course of Vedic River Sarasvati from Adi Badri to Sirsa.

This has to be followed by a launch of Sarasvati Amritadhaaraa Project in Gujarat and Rajasthan. As of April 2008, Waters of Sarasvati from manasarovar (Kailas parvatam) have already reached Gedra Road, Barmer Dist. This has resulted in stopping the march of the desert, in greening of the desert by forests replacing sand-dunes in the Thar desert and quenching the thirst of people in Rajasthan, in cities such as Jodhpur, Jaisalmer and Barmer. There is a victory tower erected at Mohangarh, 55 kms. west of Jaisalmer (close to the border with Pakistan) and the inscription on the tower reads: Sarasvati Mahanadi Roopaa Nahar. Glacial waters are now flowing beyond Mohangarh and into Barmer Dist., Rajasthan.

Only 150 kms. of work has to be done to make the waters reach Gujarat and make it a historic moment in Bharatiya itihaas. By give and take, this can be achieved: Gujarat can share its Narmada waters to Barmer and Rajasthan can give Sarasvati waters to Gujarat. It will be a historic day -- about 3 years from now -- when all citizens of India can take a dip in the holy river Sarasvati in Ahmedabad, Gujarat.

Imperative of a National Water Grid for Bharatam, that is India

The rebirth of River Sarasvati in our lifetime will result in the establishment of a National Water Grid reaching Brahmaputra flood waters to Kanyakumari (see peninsularwatergrid map) making every river south of Vidhyas in India a perennial river (jeevanadi), creating a potential for adding 9 crore acres of additional wet land and four-crop cultivation with the availability of water on 24/7 basis, round the year. This revolution to empower rural India of 6.5 lakh villages is achievable in 7 years' time by setting up a National Water Grid Authority.

The following stark statistics should make one pause and evaluate the imperative of increasing the irrigated area in the alluvial land of Bharatam, that is India.

Population	33 crores (1951)	100 crores (2001)
Agri.Prodn	65 m. t. (1951)	200 m. t. (2001)
Irrigated area	22.6 m.ha. (1951)	90 m. ha. (2001)

Alluvial land is available in India to increase the irrigated area to 175 m. ha. The interlinking of rivers alone will yield an additional 35 m. ha. of land with assured irrigation.

35 m. ha. = 9 crore acres of land (1 ha. = 2.5 acres)

This is one measure to increase the land under 3 crop cultivation and save the dying Krishna and Kaveri rivers and reach water to the unreached.

With increased availability of water and maintenance of soil health, productivity of land also can be increased from the present 2.5 tons/ha to 3 tons/ha in irrigated land; from 0.75 tons/ha to 1 ton/ha in non-irrigated land.

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If these 9 crore acres of land are distributed to 9 crore poor families, the village India will progress and India can become a developed nation by 2020 with increased per capita income and employment opportunities (apart from land ownership).

Satellite view of the interlinked system of lakes in Peninsular Bharat

The topography of the land is such that water run-offs generally tend southwards. Thus, it is possible to move Brahmaputra flood waters to Kanyakumari only through gravity flows (involving lift of about 300 ft. for part of the flows only at Inchampalli on Godavari

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river).

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Table 1 River basin and average water availability per sq. km. (MHM –Million hectare metres)

River Basin	Water resources av Million Hectare Metres	Land area covered sq.km.	Water availability (mhm) per one lakh sq. km.
Ganga	52.5	8,61,452	6.09
Brahmaputra	53.7	1,94,413	27.68
Godavari	11.05	3,12,812	3.54
Krishna	7.81	2,58,948	3.02
Kaveri	2.14	81,155	2.64
Subarnarekha	1.24	29,196	4.27
Mahanadi	6.69	1,41,580	4.74
Pennar	0.6	55,213	1.09
Narmada	4.6	98,796	4.65
West-flowing Tapi to Tadri	8.74	55,940	15.63
West-flowing Tadri to Kanyakumari	11.35	56,177	20.20

This table shows that there is NOT enough land available in Brahmaputra River Basin and the regions west of Western Ghats, to optimally use the water resources. This table also shows the vital importance of Ganga River basin which supports a land area of 8.61 lakh sq. kms. This river basin is the largest alluvial plain the world and it should be ensured that there is no water deficiency in this river basin since a large percentage of the country's population is dependent upon agricultural activities in this basin.

This calls for treating the water resources of the nation as a national resource and the National Water Grid should provide for an optimal balancing of water supply to meet the demand for water resources in all parts of the nation.

Water resources: Supply situation

Brackish and fresh water resources combined:

Seawater 97.475%
Glaciers 1.725%
Groundwater 0.775%
Rivers, tanks, swamps 0.025%

Freshwater resources only:

Glaciers 68%
Groundwater 31%
Rivers, tanks, swamps 1%

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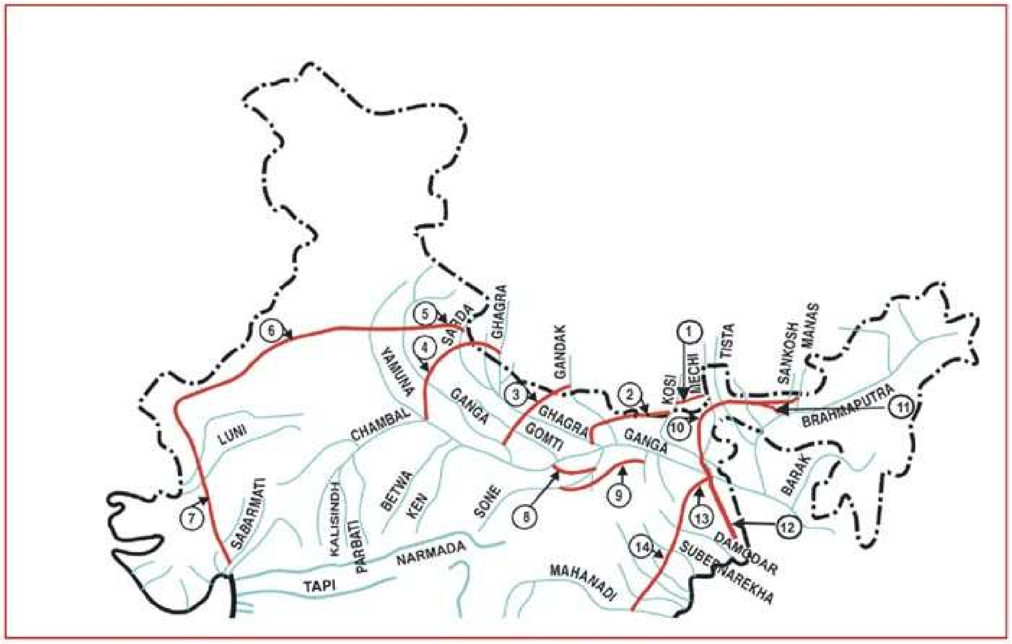
PROPOSED INTER BASIN WATER TRANSFER LINKS

HIMALAYAN COMPONENT



1. Kosi – Mechi
2. Kosi – Ghagra
3. Gandak – Ganga
4. Ghagra – Yamuna *
5. Sarda – Yamuna *
6. Yamuna – Rajasthan
7. Rajasthan – Sabarmati
8. Chunar- Sone Barrage
9. Sone Dam – Southern Tributaries of Ganga
10. Manas –Sankosh - Tista - Ganga
11. Jogighopa – Tista – Farakka (Alternate)
12. Farakka – Sunderbans
13. Ganga (Farakka) – Damodar – Subernarekha
14. Subernarekha – Mahanadi

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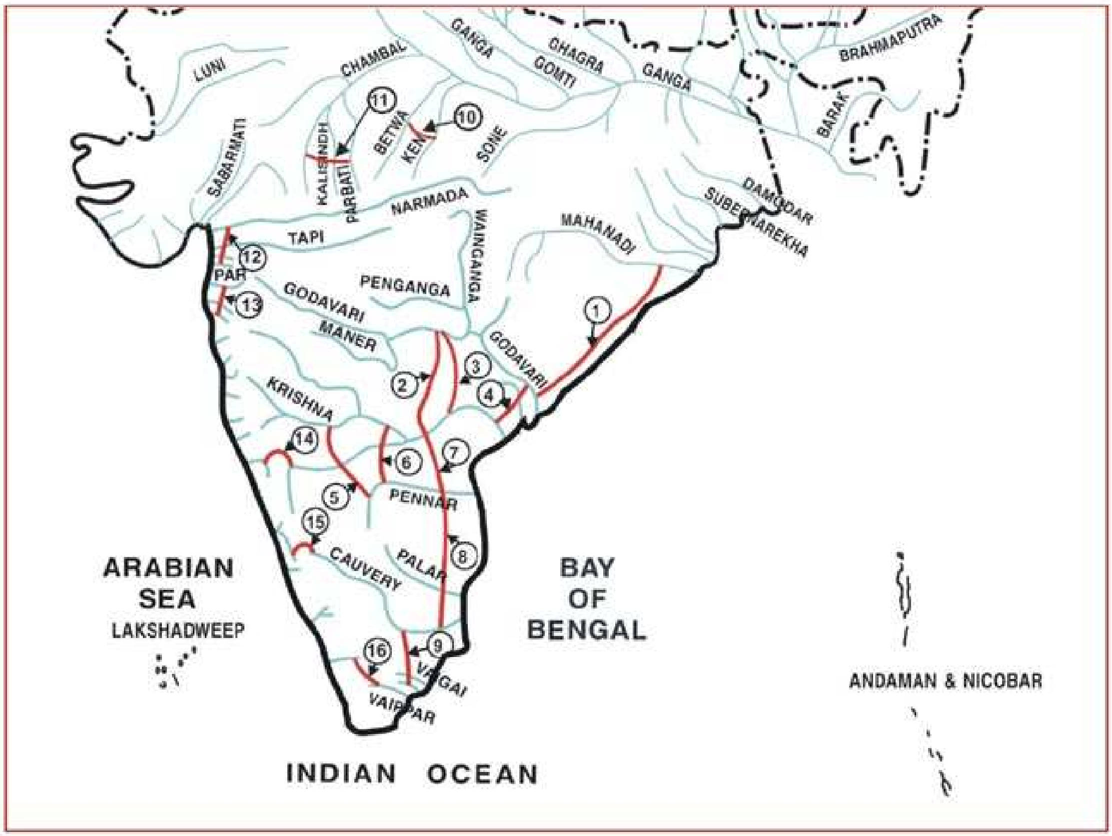
PROPOSED INTER BASIN WATER TRANSFER LINKS

PENINSULAR COMPONENT



1. Mahanadi (Manibhadra) – Godavari (Dowlaiswaram) *
2. Godavari (Inchampalli) – Krishna (Nagarjunasagar) *
3. Godavari (Inchampalli) – Krishna (Pulichintala) *
4. Godavari (Polavaram) – Krishna (Vijayawada) *
5. Krishna (Almatti) – Pennar *
6. Krishna (Srisailam) – Pennar *
7. Krishna (Nagarjunasagar) – Pennar (Somasila) *
8. Pennar (Somasila)–Palar- Cauvery (Grand Anicut) *
9. Cauvery (Kattalai) – Vaigai – Gundar *
10. Ken – Betwa *
11. Parbati – Kalisindh – Chambal *
12. Par – Tapi – Narmada *
13. Damanganga – Pinjal *
14. Bedti – Varda
15. Netravati – Hemavati
16. Pamba – Achankovil – Vaippar *

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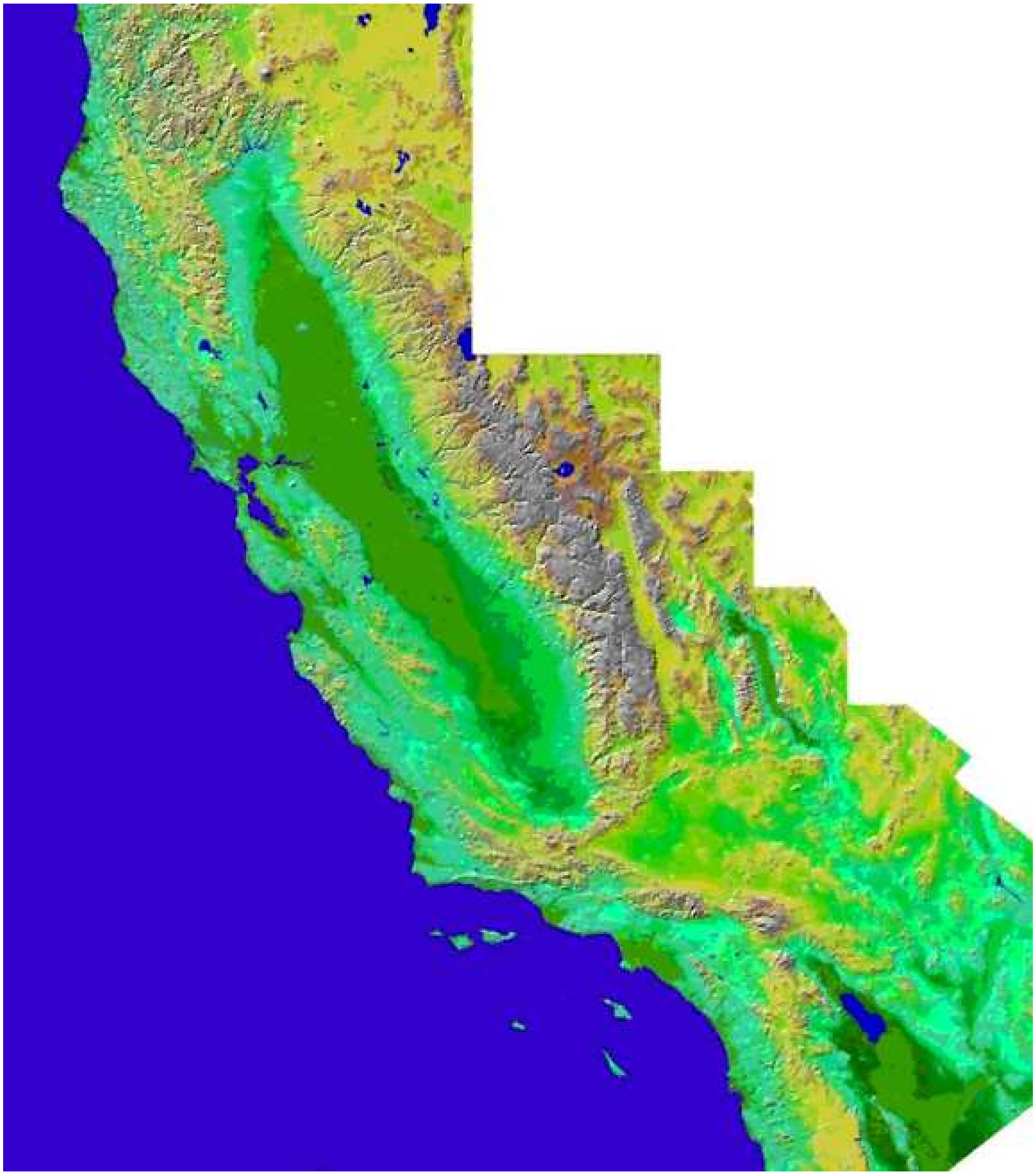

3-D Satellite radar topography

*Superimpose GIS data, to expedite choice of optimal waterways *To monitor waterflows.[66]

[66] Available from NASA for the globe, 90m. resolution Sample CARTOSAT-2 image obtained by ISRO/NRSA.

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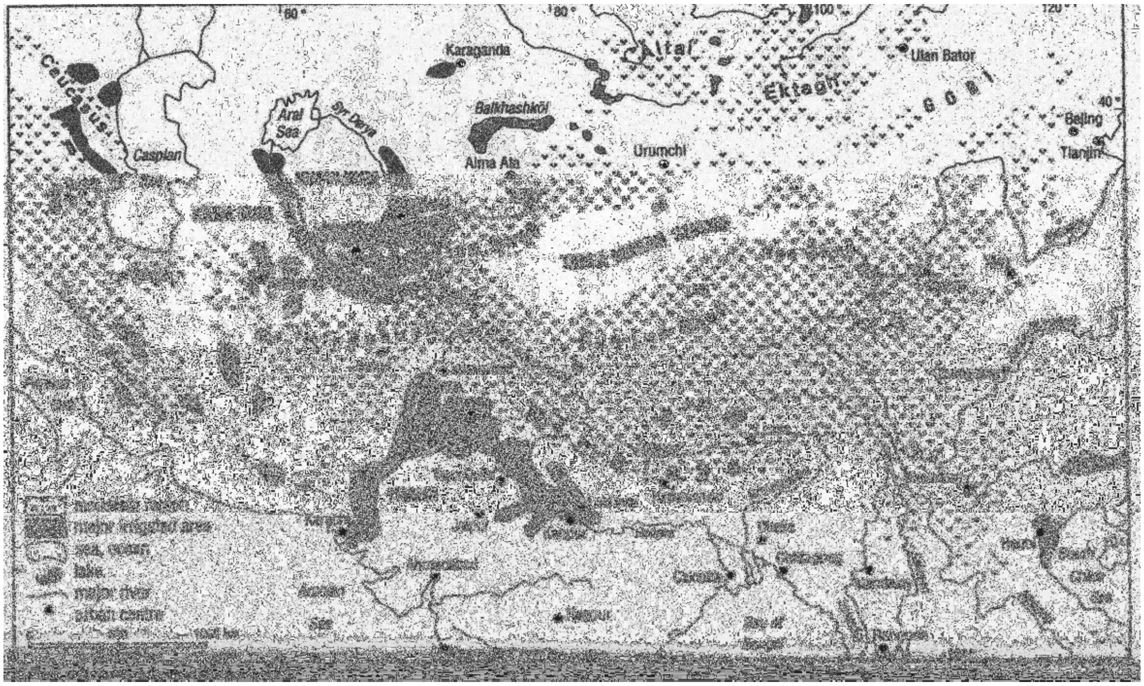

Devataatmaa Himalaya

http://hindutva97.blogspot.com/2008/06/imperative-of-national-water-grid.html

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Chapter 4. Bibliographical note refuting/questioning the Aryan Invasion/ Migration Theories

Background

In the search for clues to the peopling of India in ancient times, many theories have been put forward. During the British colonial regime, a theory called Aryan Invasion Theory was proposed to explain the roots of the Indo-European languages and common lexemes found among European and Indian languages. This theory was modified as Aryan Migration/Trickle-in Theories.

After India gained independence, and taking into account the archaeological discoveries reported particularly from Northwestern India and Pakistan, the reliability of this theory was questioned by many scholars and researchers. The problems related to the decipherment of the Indus Script have also resulted in many theories related to the formation and evolution of ancient languages of India. The discovery of the ancient courses of Vedic River Sarasvati and a large number of archaeological sites on this river basin in Northwestern India have led some to suggest that the civilization should be called Indus-Sarasvati civilization. Relating archaeological discoveries and language studies (including the so-called Indus Script problem) is a challenge which calls for many multi-disciplinary researches to delineate the peopling of India and the roots of Hindu culture during ancient periods from ca. 4th millennium BCE.
The following is an indicative list of recent works on the subject which necessitate a restatement of the indigenous/autochthonous evolution of Hindu civilization.

Nausharo: female figurine. Period 1B, 2800 – 2600 BCE. 11.6 x 30.9 cm.[After Fig. 2.19, Kenoyer, 1998]. Red paint showing sindhur at the parting of the hair. Hair painted black
Necklaces painted golden. A journalist was sent by Romila to ask Prof. BB Lal: “You have shown the gudiya (terracotta toy) painted to show sindhur at the parting of the hair. It appears that the gudiya are Hindutva forgeries.” BB Lal replied: “The excavator was a French archaeologist, Jean Paul Jarrige. The workers who discovered the gudiya were Pakistani workers at Nausharo. I don’t think they are Hindu. Accept the fact that the gudiya show the continuity of Bharatiya Samskruti for the last 4500 years.”
The discovery and rebirth of River Sarasvati result in a perspective to underscore the continuum evidenced by many cultural indicators such as the practice of wearing sindhur at the parting of the hair by married women, worship of Shivalinga, pushkarinis, veneration of s'ankha (turbinella pyrum) which is an 8500 year old continuing industry, metallurgical techniques of making bronze statues and veneration of

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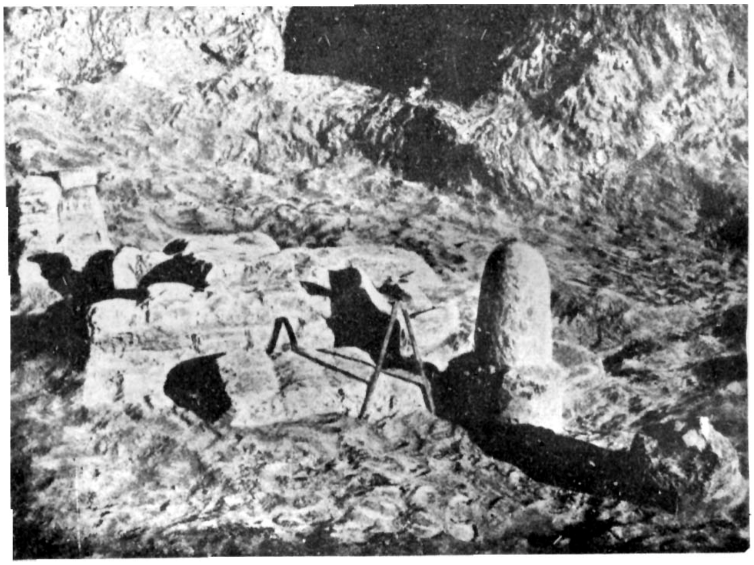
River Sarasvati as mother and as a divinity. Such indicators call for further researches to provide a fair account of socio-cultural history of India.
Ornaments including a cut, wide s'ankha bangle made of turbinella pyrum found in a woman's burial in Mehrgarh. Dated to ca. 6500 BCE.



lPlate X [c] Lingam in situ in Trench Ai (MS Vats, 1940, *Excavations at Harappa*, Vol. II, Calcutta) lS'iva linga found at Harappa is shaped like the summit of Mt. Kailas

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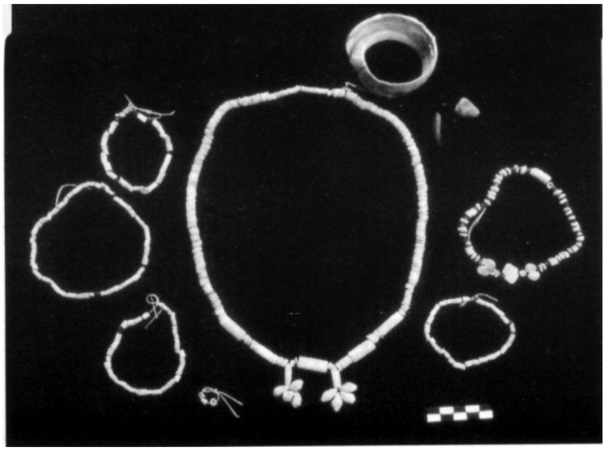

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